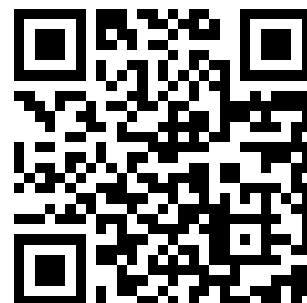

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THE WINDS AT SEA;

THEIR MEAN DIRECTION AND ANNUAL AVERAGE DURATION FROM EACH OF THE FOUR QUARTERS.

In this investigation the oceans from the equator to the parallels of 60° north and south are divided into bands 5° of latitude broad. Each band extends entirely across its ocean. The meridian of 20° east is taken as the dividing line between the South Atlantic and South Indian Oceans; the meridian of 120° E. as the dividing line between the South Indian and South Pacific, and that of 70° W. as the dividing line between the South Pacific and South Atlantic.

The following tables show the number of observations, contained in the "fields"* that come within the several bands in each ocean, which make a grand total of 1,213,930; each observation embraces a period of eight hours. If we add to these the 21,034 observations in the China Sea also, which extends in north latitude from 105° to 125° E., we have a total of observations which, if drawn out in a continuous series of one for every eight hours, would embrace a period only a few days short of 1,120 years.

WINDS AND CALMS IN THE ATLANTIC OCEAN.

Total number of observations in each band; mean direction of the wind from each quarter; average annual duration of same in days; ditto for calms.

Band.	NORTH.					SOUTH.				
	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.
0° and 5°.....	N. 52° E.	E. 49° S.	S. 24° W.	W. 57° N.	21,667	N. 60° E.	E. 37° S.	S. 33° W.	W. 46° N.	15,463
Days.....	85	192	49	11	26 C. D.*	96	314	17	4	4 C. D.*
5° and 10°.....	N. 53° E.	E. 48° S.	S. 30° W.	W. 45° N.	22,777	N. 69° E.	E. 43° S.	S. 31° W.	W. 47° N.	13,714
Days.....	136	91	86	18	34 C. D.	94	329	10	2	0 C. D.
10° and 15°.....	N. 54° E.	E. 25° S.	S. 43° W.	W. 48° N.	16,950	N. 63° E.	E. 40° S.	S. 26° W.	W. 57° N.	14,422
Days.....	244	60	24	19	18 C. D.	58	295	8	2	2 C. D.
15° and 20°.....	N. 55° E.	E. 20° S.	S. 38° W.	W. 57° N.	19,845	N. 55° E.	E. 38° S.	S. 29° W.	W. 63° N.	17,844
Days.....	244	89	10	13	9 C. D.	69	244	14	12	6 C. D.
20° and 25°.....	N. 50° E.	E. 35° S.	S. 39° W.	W. 52° N.	25,614	N. 45° E.	E. 43° S.	S. 37° W.	W. 57° N.	20,762
Days.....	203	96	25	25	16 C. D.	123	157	37	39	9 C. D.
25° and 30°.....	N. 49° E.	E. 38° S.	S. 39° W.	W. 47° N.	36,862	N. 44° E.	E. 49° S.	S. 38° W.	W. 54° N.	19,817
Days.....	127	99	67	51	21 C. D.	109	124	62	62	8 C. D.
30° and 35°.....	N. 44° E.	E. 48° S.	S. 42° W.	W. 44° N.	12,897	N. 39° E.	E. 49° S.	S. 42° W.	W. 47° N.	15,845
Days.....	86	88	101	73	17 C. D.	67	108	91	89	10 C. D.
35° and 40°.....	N. 42° E.	E. 51° S.	S. 45° W.	W. 42° N.	22,207	N. 38° E.	E. 48° S.	S. 47° W.	W. 43° N.	23,581
Days.....	74	65	126	86	14 C. D.	52	55	114	135	9 C. D.
40° and 45°.....	N. 43° E.	E. 51° S.	S. 46° W.	W. 40° N.	16,299	N. 35° E.	E. 52° S.	S. 48° W.	W. 45° N.	8,783
Days.....	58	68	123	100	16 C. D.	53	35	125	142	10 C. D.
45° and 50°.....	N. 45° E.	E. 49° S.	S. 48° W.	W. 39° N.	8,491	N. 27° E.	E. 45° S.	S. 54° W.	W. 46° N.	4,330
Days.....	52	57	136	107	12 C. D.	54	94	123	155	9 C. D.
50° and 55°.....	N. 49° E.	E. 49° S.	S. 48° W.	W. 38° N.	3,610	N. 30° E.	E. 51° S.	S. 57° W.	W. 45° N.	3,732
Days.....	52	85	128	86	14 C. D.	65	19	129	146	6 C. D.
55° and 60°.....	N. 35° E.	E. 50° S.	S. 47° W.	W. 41° N.	392	N. 36° E.	E. 54° S.	S. 59° W.	W. 40° N.	4,370
Days.....	49	51	164	95	6 C. D.*	48	18	121	167	11 C. D.*

* C. D. Calm days.

* "Field:" the spaces of 5° longitude by 5° latitude, in which the Pilot Charts are divided.

THE WINDS AT SEA.

WINDS AND CALMS IN THE PACIFIC OCEAN.

Total number of observations in each band; mean direction of the wind from each quarter; average annual duration of same in days; ditto for calms.

Band.	NORTH.					SOUTH.				
	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.
0° and 5°.....	N. 57° E.	E. 46° S.	S. 30° W.	W. 48° N.	46,162	N. 59° E.	E. 40° S.	S. 36° W.	W. 51° N.	43,218
Days	49	206	89	12	9 C. D.*	76	229	27	25	8 C. D.*
5° and 10°.....	N. 54° E.	E. 46° S.	S. 33° W.	W. 44° N.	14,064	N. 57° E.	E. 30° S.	S. 49° W.	W. 41° N.	24,916
Days	143	134	54	20	14 C. D.	62	243	25	25	10 C. D.
10° and 15°.....	N. 51° E.	E. 30° S.	S. 47° W.	W. 50° N.	10,389	N. 55° E.	E. 36° S.	S. 45° W.	W. 52° N.	11,367
Days	266	43	19	27	10 C. D.	96	219	14	25	11 C. D.
15° and 20°.....	N. 51° E.	E. 27° S.	S. 47° W.	W. 52° N.	13,258	N. 58° E.	E. 36° S.	S. 38° W.	W. 49° N.	11,420
Days	243	49	15	45	13 C. D.	89	216	18	29	13 C. D.
20° and 25°.....	N. 53° E.	E. 28° S.	S. 45° W.	W. 52° N.	18,913	N. 58° E.	E. 38° S.	S. 41° W.	W. 51° N.	13,668
Days	212	66	25	52	10 C. D.	91	195	37	29	13 C. D.
25° and 30°.....	N. 53° E.	E. 37° S.	S. 43° W.	W. 48° N.	31,915	N. 54° E.	E. 41° S.	S. 39° W.	W. 46° N.	13,658
Days	142	99	60	50	14 C. D.	80	154	77	41	13 C. D.
30° and 35°.....	N. 50° E.	E. 42° S.	S. 32° W.	W. 45° N.	49,617	N. 48° E.	E. 49° S.	S. 39° W.	W. 43° N.	34,160
Days	96	109	92	56	12 C. D.	63	103	112	74	13 C. D.
35° and 40°.....	N. 42° E.	E. 49° S.	S. 42° W.	W. 46° N.	19,026	N. 38° E.	E. 51° S.	S. 43° W.	W. 44° N.	27,314
Days	93	70	96	93	13 C. D.	63	54	129	106	13 C. D.
40° and 45°.....	N. 47° E.	E. 43° S.	S. 44° W.	W. 41° N.	16,953	N. 35° E.	E. 50° S.	S. 48° W.	W. 43° N.	36,963
Days	66	68	113	102	16 C. D.	56	35	125	141	8 C. D.
45° and 50°.....	N. 43° E.	E. 44° S.	S. 47° W.	W. 40° S.	20,970	N. 31° E.	E. 45° S.	S. 53° W.	W. 42° N.	18,469
Days	62	74	110	107	12 C. D.	49	32	129	147	8 C. D.
50° and 55°.....	N. 44° E.	E. 47° S.	S. 48° W.	W. 38° N.	37,960	N. 36° E.	E. 51° S.	S. 56° W.	W. 37° N.	10,554
Days	56	72	123	101	13 C. D.	41	36	118	164	6 C. D.
55° and 60°.....	N. 47° E.	E. 47° S.	S. 47° W.	W. 37° N.	17,482	N. 38° E.	E. 47° S.	S. 56° W.	W. 41° N.	9,247
Days	58	92	119	81	15 C. D.*	46	30	95	186	8 C. D.*

* C. D. Calm days.

WINDS AND CALMS IN THE INDIAN OCEAN.

Total number of observations in each band; mean direction of the wind from each quarter; average annual duration of same in days; ditto for calms.

Band.	NORTH.					SOUTH.				
	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.
0° and 5°.....	N. 41° E.	E. 49° S.	S. 46° W.	W. 39° N.	9,369	N. 46° E.	E. 48° S.	S. 44° W.	W. 39° N.	14,964
Days	82	60	138	67	18 C. D.*	49	124	96	71	25 C. D.*
5° and 10°.....	N. 44° E.	E. 43° S.	S. 50° W.	W. 38° N.	8,841	N. 53° E.	E. 42° S.	S. 38° W.	W. 39° N.	16,018
Days	111	42	140	60	12 C. D.	51	178	63	54	19 C. D.
10° and 15°.....	N. 46° E.	E. 44° S.	S. 47° W.	W. 45° N.	7,483	N. 60° E.	E. 45° S.	S. 41° W.	W. 40° N.	18,028
Days	127	52	123	51	12 C. D.	37	241	47	27	13 C. D.
15° and 20°.....	N. 42° E.	E. 43° S.	S. 46° W.	W. 46° N.	6,800	N. 67° E.	E. 40° S.	S. 34° W.	W. 44° N.	17,340
Days	116	36	145	57	11 C. D.	43	272	34	10	6 C. D.
20° and 25°.....	N. 41° E.	E. 48° S.	S. 43° W.	W. 50° N.	1,874	N. 62° E.	E. 41° S.	S. 29° W.	W. 42° N.	31,965
Days	84	54	148	66	13 C. D.*	83	215	40	18	9 C. D.
25° and 30°.....	.....	.....	.....	.....	.....	N. 54° E.	E. 42° S.	S. 36° W.	W. 50° N.	33,160
Days .....	.....	.....	.....	.....	.....	108	146	62	39	10 C. D.
30° and 35°.....	.....	.....	.....	.....	.....	N. 45° E.	E. 47° S.	S. 44° W.	W. 42° N.	26,949
Days .....	.....	.....	.....	.....	.....	75	84	113	83	10 C. D.
35° and 40°.....	.....	.....	.....	.....	.....	N. 39° E.	E. 46° S.	S. 41° W.	W. 39° N.	56,336
Days .....	.....	.....	.....	.....	.....	49	52	122	129	7 C. D.
40° and 45°.....	.....	.....	.....	.....	.....	N. 32° E.	E. 51° S.	S. 54° W.	W. 42° N.	18,623
Days .....	.....	.....	.....	.....	.....	47	20	126	167	5 C. D.
45° and 50°.....	.....	.....	.....	.....	.....	N. 38° E.	E. 41° S.	S. 53° W.	W. 39° N.	6,333
Days .....	.....	.....	.....	.....	.....	62	39	97	161	6 C. D.*

* C. D. Calm days.

WINDS AND CALMS IN THE WEST INDIA AND CHINA SEAS.

Total number of observations in each band; mean direction of the wind from each quarter; average annual duration of same in days; ditto for calms.

Band.	CHINA SEA.					WEST INDIES.				
	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.	1st quarter.	2d quarter.	3d quarter.	4th quarter.	Observations.
0° and 5°.....	N. 38° E.	E. 53° S.	S. 34° W.	W. 44° N.	3,834	.....	.....	.....	.....	.....
Days	106	85	113	48	13 C. D.*	.....	.....	.....	.....	.....
5° and 10°.....	N. 43° E.	E. 48° S.	S. 49° W.	W. 39° N.	4,672	.....	.....	.....	.....	.....
Days	125	54	134	45	7 C. D.	.....	.....	.....	.....	.....
10° and 15°.....	N. 46° E.	E. 45° S.	S. 51° W.	W. 41° N.	5,358	N. 60° E.	E. 20° S.	S. 42° W.	W. 42° N.	519
Days	135	68	116	42	4 C. D.	260	82	6	5	12 C. D.*
15° and 20°.....	N. 47° E.	E. 43° S.	S. 32° W.	W. 57° N.	4,298	N. 61° E.	E. 20° S.	S. 38° W.	W. 58° N.	2,696
Days	175	84	73	29	4 C. D.	209	120	10	12	14 C. D.
20° and 25°.....	N. 47° E.	E. 43° S.	S. 39° W.	W. 58° N.	2,564	N. 54° E.	E. 29° S.	S. 42° W.	W. 73° N.	5,418
Days	199	80	56	26	4 C. D.	191	103	19	30	22 C. D.
25° and 30°.....	N. 28° E.	E. 46° S.	S. 34° W.	W. 54° N.	318	N. 49° E.	E. 40° S.	S. 37° W.	W. 49° N.	2,317
Days	189	43	72	60	1 C. D.	128	106	53	58	20 C. D.*

* C. D. Calm days.

NUMBER OF OBSERVATIONS.

	North.	South.	Total.
Indian ocean	34,367	248,316	282,683
Atlantic ocean	207,621	172,663	380,284
Pacific ocean	296,709	254,254	550,963
Grand total .....	.....	.....	1,213,930

These tables were compiled from the pilot charts by Lieutenants Guthrie, Vanzandt, and Houston; coming from these charts they are not rigidly exact; and for this reason:

The winds are entered on the pilot charts only for what are called the alternate points—alternate counting from the cardinal, as N.; N.NE.; NE.; E.NE.; and so on, which are 22° 30' apart—consequently, in getting out for the pilot charts the winds from the log-books, all the winds between E. by N. and E. by S. were counted and entered on those charts as “east” winds; and so with the other alternate points, as E.SE., SE., &c. Taking into view the methods usually adopted at sea for determining the direction of the wind, and considering that when sailing free no allowance is generally made by navigators for what may be called the *aberration* of the wind, it was considered as a useless attempt at refinement to have the pilot charts recognize more than 16 points of the compass; for this reason no allowance was made on the pilot charts for variation when it was less than a point. More than one point but less than three, the variation was called two points; more than three but less than five, it was put down as four.

Now, when with these charts so constructed we came to inquire how many winds in any “field” on the Pilot’s had northing and easting in them, we had to compute the answer, for we could not tell how many of the winds entered on these charts as from the north point had *easting* in them, nor how many of those entered as from the east point had *northing* in them. The answer had to be computed approximately, and in the computation the argument used was the ratio of the differences between the winds from the cardinal points and the winds from the contiguous point on each side of it, as E., E.NE., and E.SE.

Thus we obtained not the exact number, but an approximation to the exact number of winds from each quadrant. This result, though but an approximation, is, nevertheless, when we consider the nature of the problem and the character of the data, sufficiently near the truth for present purposes.

In order to render these tables as instructive and as suggestive as possible, Lieutenant May has expressed them in the graphic form as per Plates I, II, and IV, hereunto annexed.

On these plates, the columns are the wind bands from the equator to the parallel of 60° , and the horizontal lines are the days of the year. In Figs. 1, 2, 3, and 4, Plate II, the circles are the wind bands for every 5° of latitude from the equator to the parallel of 60° north and south; the red and blue marks showing the mean annual direction of the wind in each band—red in the southern, blue in the northern hemisphere; also red for the West Indies—Fig. 4. Plate IV relates to the China and West India Seas, and to the general movement from north to south, and from south to north of the winds out upon the open sea in all oceans. With this explanation these plates are both instructive and suggestive.

Beginning at 60° in the South Atlantic, (Plate I, Fig. 2,) we find NW. winds most prevalent; but they become less and less so as you proceed towards the equator. Crossing 40° , the curves representing the NW. and SW. winds join each other and march to the equator, descending as they go, but following each other with remarkable regularity. Crossing the equator, the curve "SW." mounts up for the summer monsoons of the North Atlantic; but passing the "doldrum" parallels, it sinks down again to join the curve from the NW., whence the two curves mount and march together again; the winds they represent being each one more and more prevalent until you cross the parallel of 45° N., where one goes up, the other down. In other words, from 40° S. to the equator, a wind from the NW. is met with at sea just about as frequently as one from the SW., though the nearer the equator the less frequently do they occur. On the polar side of these parallels the difference as to prevalence of NW. and SW. winds increases until the two curves reach the parallel of 60° , beyond which observations have not been carried in sufficient numbers. But this conformity between this pair of wind curves is repeated in the South Indian and in both the North and South Pacific Oceans with remarkable regularity; so much so as to suggest that the agents which produce the NW. and SW. winds, especially those which reside between the equator and 45° S., are similar in their nature and equal as to influence. The same may be said of the NE. and SE. winds between the parallels of 30° and 45° in all oceans. The curves which represent the winds from these quadrants are the reverse of those of the other two quadrants. Beginning at the parallel of 60° in the South Atlantic and proceeding north, the blue curves, like the red, march together; but instead of descending they ascend until they reach the parallel of 20° — 25° S. Here they separate abruptly, the NE. dropping down and the SE. mounting up, to denote the SE. trade wind, which, in the South Atlantic, attains its greatest prevalence between the parallels of 5° and 10° S., and a greater average annual duration (330 days) than in any other ocean.

About the parallels of 30° and 35° north and south, and in every sea, the curves representing the "four winds" come near together, each wind prevailing there, on the average, about 90 days in the year. As we approach the equator from this place of meeting, (vide blue curves, South Atlantic,) the trade-wind force begins to make itself felt. That it does so, is shown by the rapid mounting up of the curve which represents this wind, and the sudden falling off of the other, the blue curve.

Now, may we not ask the question whence comes the air that supplies this wind and enables it, as it crosses parallel after parallel, to blow more and more days until you reach the parallel of 5° S.? This supply of air does not come from the polar side of 30° S., for we have seen that about that parallel the winds prevail nearly alike from all quarters. On the contrary, we find that this wind, when it crosses the parallel of 25° , is supplied with air enough to keep it blowing for 157 days in the year. Between that and the parallel of 15° it receives air enough to supply it for 86 days longer, and by the time it gets on the equatorial side of 10° its total supply is sufficient to keep it blowing for 330 out of the 365 days of the year. Therefore, after crossing the parallel of 25° S., a supply of air is obtained sufficient *at least* to feed the SE. trade-winds for 108 days. Whence comes it?

Between the parallels of 5° and 10° S. it has been shown by actual measurement (Chapter XX, Physical Geography of the Sea; new edition, 1859,) that these winds attain their greatest velocity. Moreover, the band between the parallels of 5° and 10° being near the equator, represents a larger area than the band between the parallels of 20° and 25° ; so that it is by no means extravagant to assume that the volume of air which the SE. trade-winds waft across the band 5° – 10° in 330 days, is very much more than twice the volume which the same winds waft across the band 20° – 25° in 157 days.

The question therefore may be repeated, whence comes the supply to satisfy this increased demand?

The blue curve itself suggests the answer :

The trade-winds are pouring their volume of air into the equatorial calm belt, where there is a rising up—an expansion—a boiling over, and flowing back in the upper regions. These trade-winds, the nearer they get to this place of ascent the more briskly do they blow. Blowing thus, they act as a sort of under-tow with regard to the upper and counter current, drawing supplies from it, and carrying the volumes so drawn back into the equatorial calm belt.

The parallels of latitude decrease in circumference as you go from the equator to the poles. This circumstance, even if there were no under-tow, would call for a continual turning back or sloughing off from a band of air running pole-wards. Consequently, the very figure of the earth assists this *under-tow*, as the trade-winds may be called, in drawing down fresh supplies of air from the counter current above.

These premises being admitted, we may, it appears to me, when speaking of the general movements of the atmosphere, say, with plausibility, if not with reason, that every wind which spreads over any considerable portion of the earth's surface is, when it blows from the poles towards the equator, as the trade-winds do, for example, fed with air from above. And, on the other hand, that a wind that blows towards the poles, as do the counter trades, for example, instead of drawing down air from the upper regions, sloughs or gives off air in the upper regions to feed the upper currents there.

To make this clear, let us imagine a north wind to be blowing all around the earth, across the parallel of 45° S., and that it extends to the height of one mile. A cross section of such a wind extending all around the earth at the parallel of 45° would represent an area in round numbers (and approximately only) of 15,264 square miles.

Now, let us follow this same wind to the parallel of 60° S. Supposing its height and velocity the same at 60° as they were at 45° , the area of a similar cross-section of the moving mass of air would, as it crosses this parallel, be represented by 10,800 square miles—difference, 4,464. Now, what has become of the air which flowed through this area, (4,464 square miles,) by which the cross-section at the parallel of 45° exceeds the cross-section on the parallel of 60° ? Answer. In the case supposed, it would have risen up and turned back; in nature the "conservation of areas" here may be maintained partly by increased velocity; but in nature the velocity of an equatorial wind does not, as it approaches the pole, preserve any such ratio of increase as this conservation would require. In nature, therefore, there *must* be, with all polar-bound winds of great breadth, a rising up and a turning back in the upper regions. As the air rises, the vapor which it may have sucked up from that great waste of southern waters is cooled and condensed.

In this process, the latent heat of the vapor becomes sensible heat. It expands the upper air, causing it to ascend still higher, and to call for still greater indraughts and uprisings from below, until the surface wind rushes in with stormy violence.

Whenever there is a storm in this part of the ocean there is rain.* Not so in corre-

* Physical Geography of the Sea, Chap. XX, 1859.

sponding latitudes north, because the ascending air there not being so heavily laden with vapor, (for here it blows mostly over land instead of water,) does not, when it reaches the upper regions, liberate latent heat from its vapor sufficient to produce the expansion which that over southern seas does.

Let us pause here and survey the position to which the bending of these curves and this process of reasoning have conducted us.

Have we not unmasked here one of the causes of the low barometer and the abundant precipitation which obtain on the polar side of 40° S.? There the NW. winds become the prevailing winds. As they reach parallel after parallel on their way towards the pole, each successive one becomes smaller and smaller; there is consequently a constant sloughing off—a rising up and a turning back of air that has been wafted across the great southern waste of waters. It is loaded with vapor, the latent heat of which is liberated as it rises up. This heat causes the upper air to expand, to rise up, to join the upper polar current, and flow back with it towards the equator as dry air. It is the heat thus liberated which drives off the air from high southern latitudes, leaving there a permanently low range for the barometer. To this agency we ascribe the “barometric anomalies off Cape Horn;” and to this uprising of air columns may we not with equal probability ascribe the succession of rains in high southern latitudes the year round, regardless of seasons or periods?

The mean height of the barometer off Cape Horn is 0.75 inch less than it is at the equator, and in northern latitudes generally. Consequently, the latent heat of this south sea vapor that is carried up and set free in Cape Horn regions is enough to keep permanently expelled thence about one-fortieth part of the atmosphere. Is it not the same all the way around the earth to the south of the Cape Horn parallel?

This view suggests another reason why the trade-winds at sea are for the most part rainless winds, and the counter trades, especially of the south, ra'n winds; for in the extra-tropical south, columns of air loaded with moisture are, owing to the configuration of the earth, continually rising up and pouring down that moisture; whereas, in the trade-wind regions, columns of this same air, or other air that has been relieved of its moisture by a like process, are as continually coming down. This upper air is dry air, and therefore tends to take up, not let down moisture.

With the glimpse which, in the study of these curves, we catch as to the workings of the atmospherical machinery, we are enabled to make the diagram of the winds (Plate III, vol. 1, Maury's Sailing Directions, and page 75, Physical Geography of the Sea) more true to nature. The arrows which fly around the circle, and which represent the upper currents, are here (Plate III) altered so as to represent the indraughts into the trade-winds from above, the “sloughing off” from the anti-trades below.—(See the curved arrows *N. N.*)

It appears also—Plates I and II—that about the calm belts of Cancer and Capricorn, the average annual duration of the winds is nearly the same for each of the four quarters; that thence to the parallel of about 40° , the NW. and SW. winds are in the ascendant and equally prevalent; and after that, as you approach the pole, the NW. winds in the southern and the SW. winds in the northern hemisphere become, each on its side of the equator, more and more prevalent. Thus we have over the sea in each hemisphere—I speak not of the land, for I am treating of observations at *sea* only—a band or belt where the winds prevail nearly alike from the four quarters; another, where they prevail nearly alike from each of the two western quadrants; and another, as on the polar side of 45° and on the equatorial side of 30° —see Diagram III—in which the winds for the trade-wind quadrant on one hand and the anti-trade quadrant on the other are decidedly in the ascendant.

Following the curves of the NE. and SE. winds from 60° towards the equator, we observe, as a rule, that the curves which represent these two winds march and mount up together until

they cross the parallel of 25° N. and S. Here the trade-wind influence, or rather the cause which produces the trade-winds, seems to begin to make itself felt. Its influence becomes more and more marked as you approach the equatorial calm belt, and until it produces its maximum effect, which is developed between 5° and 10° for the SE., and between 10° and 15° for the NE. trade-wind.

These curves tell us in their mute and peculiar way, what, indeed, we had learned from other sources, that the cause which produces the trade-wind is seated near and about the equator, at a mean say between 5° S. and 10° N.

Going from the equator towards the poles the wind-curves for the NW. and SW. mount up and march together until they reach the parallel of about 40° . Here they separate, the counter trade-wind curve mounting up, the other down, very much as the trade-wind curve and its companion do after getting on the equatorial side of latitude 25° , and fairly within the trade-wind influence. This turning down and mounting up is particularly well developed in the South Pacific (Plate I) where there is no land to interfere with the wind in its normal circuits.

Are we to infer from this that while the cause which produces the trade-wind has power to make itself felt only 25° from the equator, that which produces the counter-trades has power to control the wind in its direction all the way from the poles to the parallel of 40° , or across a band 50° of latitude in breadth? Observe how closely the red curves on the polar side of 40° , especially in the South Indian and Pacific oceans, imitate in their flexures the blue, after these get on the equatorial side of 25° .

This resemblance between the curves of the equatorial and polar-bound winds begets a longing for more observations on the polar side of 60° . Between 40° and 70° S., all around the earth, there is, with the exception of a speck of land here and there, a water surface. These NW. winds which prevail in this belt must take up from such a surface an immense evaporation. Is it not the latent heat which is borne with this vapor into the antarctic regions and there liberated which produces such a rarefaction there that the indraught is felt as far as the parallel of 40° .?—(Vide Chap. XX, Phys. Geog. Sea., 1859.) Alas, it is not likely to come within the compass of my power to obtain, except sparingly, further observations that bear upon this question.

Of all seas, calms are most prevalent in the North Atlantic and Indian oceans.

The curve of the SW. wind mounts up in a very remarkable manner about the equator in all these oceans. In the Indian ocean it is the SW. monsoon; and it shows that there are SW. monsoons about the equator, both in the North Atlantic and Pacific. In these two oceans the curve for this wind commences to mount between 10° and 15° N. In the Atlantic, it goes up chiefly by two steps and comes down by one; in the Pacific, it goes up by one and comes down by two. This SW. monsoon of the equator appears by the diagrams to be better developed in the North Pacific than it is in the North Atlantic. It is also 5° nearer the equator in one ocean than in the other—facts which this mode of gathering the observations from the pilot charts and of presenting them to the eye has brought to my notice for the first time.

The NE. trade-winds of the Pacific appear to be better developed than the SE. of that ocean, and also than the NE. of either of the two other oceans.

I am not aware that such a mass of observations upon the direction and duration of the winds has ever before been grouped together. I have, therefore, thought it not amiss to call attention of co-operators briefly to some of the most striking and suggestive features to which the results point.

Still further to illustrate the polar and equatorial movements of this great atmospherical machine which encompasses our planet, I have taken the winds of the Atlantic, Pacific, and South Indian oceans, and grouped them all together, classing them only as winds with *nothing*

or as winds with *southing* in them. Thus classed for each hemisphere, they are projected on Plate IV, Fig. 3. These curves speak for themselves. The winds of the North Indian ocean and China sea are excluded from this figure because of their anomalous character, and because the object of this figure is to show the rule as nearly as possible. Taking these curves for our guide we may announce it as a rule, that in our hemisphere the polar winds, that is, those winds which come from *towards* the pole, obtain their mean maximum development between the parallels of 10° and 15° N.; in the other, between 5° and 10° S.; that the same is the case with the equatorial winds in their mean minimum development, (see the broken lines;) that calms in all latitudes, except between the parallels of 20° and 25° , are more prevalent in the Northern than in the Southern hemisphere; that, instead of four systems of winds—"the trades and anti-trades" between the parallels of 60° North and South—as has been heretofore held, there are, in fact, eight, that is, four on each side of the equator. Thus, counting in our hemisphere from the equator, (see Plate III,) we have, 1st, the NE. trades; 2d, the horse latitudes, with the belt of variable winds blowing equally from the four quarters; 3d, the belt of westerly winds, which prevail nearly as much from the NW. as from the SW., between the parallels of 35° and 45° on both sides of the equator; 4th, the belt of SW., or counter trades, which, on the polar side of 45° N., are the prevailing winds at sea, as far as the observations of the Pilot Chart have been multiplied and extended to a degree sufficient to give weight to their testimony.

In like manner, beginning at the equator and going south, we have, 1st, the belt of the SE. trades; 2d, the belt of winds from the four quarters, about the Tropic of Capricorn; 3d, the belt of winds from the two western quadrants about the parallel of 45° S.; and 4th, the belt of counter* trades or winds from the NW., on the polar side 45° S.

In Figs. 1 and 2 of Plate IV the wind-curves for the West India and China seas are contrasted. In the one we have a SW., in both a SE. monsoon, as well as the NE. trade.

The curves in these two seas afford a fine illustration as to the influence of the land upon the winds at sea, and through them upon the hypsometry of neighboring districts.

Figs. 1, 2, 3, and 4, Plate II, show the mean direction of the wind by quadrants in each band from the equator to the parallel of 60° N. and S., the inner circle representing the equator. The blue dash marks the direction for the Northern, and the red for the Southern hemisphere.

The most noticeable features in these diagrams are in the gradual changes, or rather the indications of a law denoting a regular gradation in the mean direction of the winds considered by quadrants, (thus: Figs. 1 and 2,) as you proceed from the equator towards either pole, the winds from the two western quadrants have their mean annual direction more and more from the west, while those from the two eastern quadrants have their mean annual direction more and more from towards the poles.

Near the parallel of 35° N. and S. the mean direction of the "four winds" is at an angle each one of about 45° with the meridian.

Such are some of the most striking features and obvious phenomena which these plates and diagrams present. The meteorologist, as well as the navigator, will find them a very suggestive object of study.

M. F. MAURY.

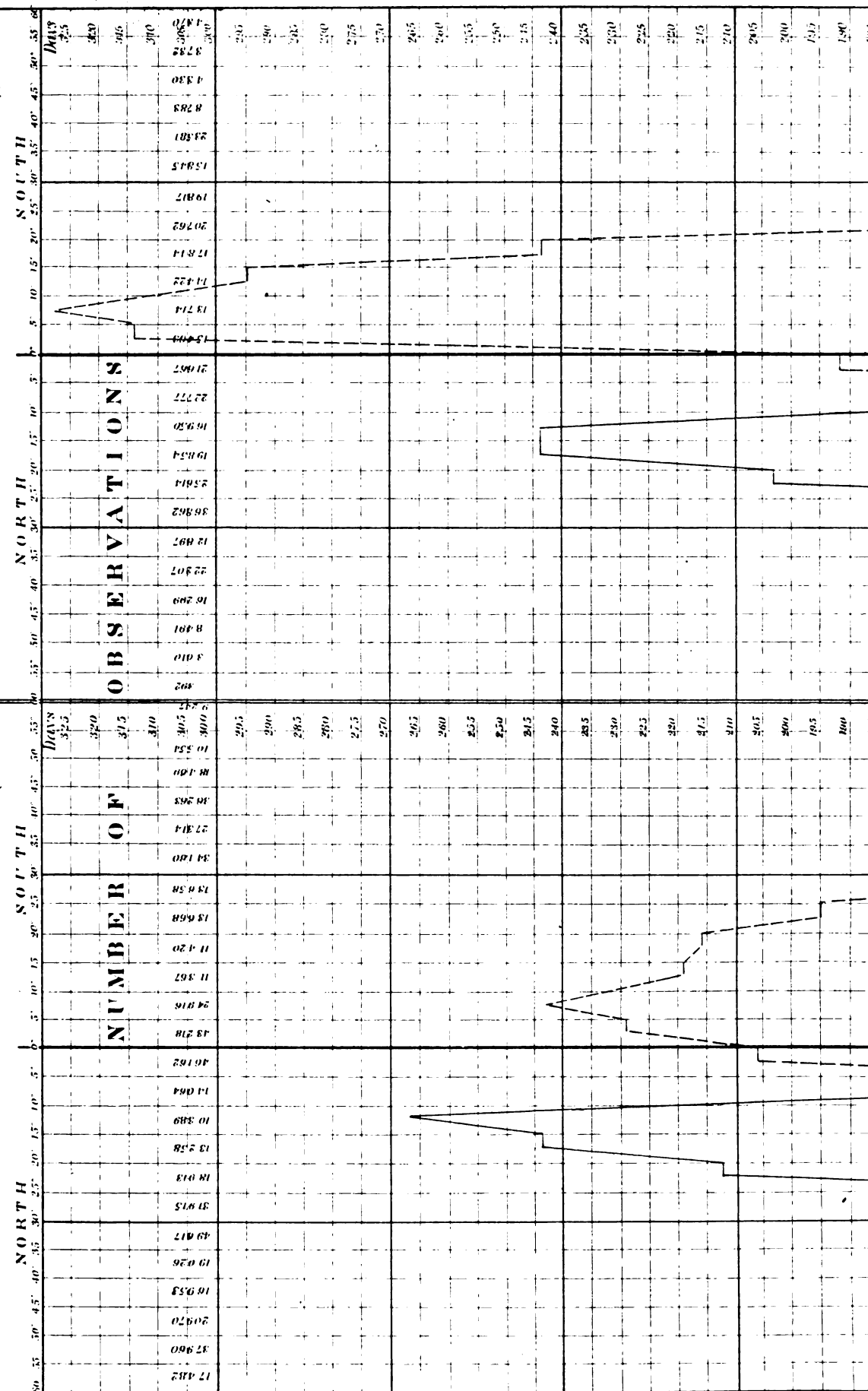
OBSERVATORY, *August*, 1859.

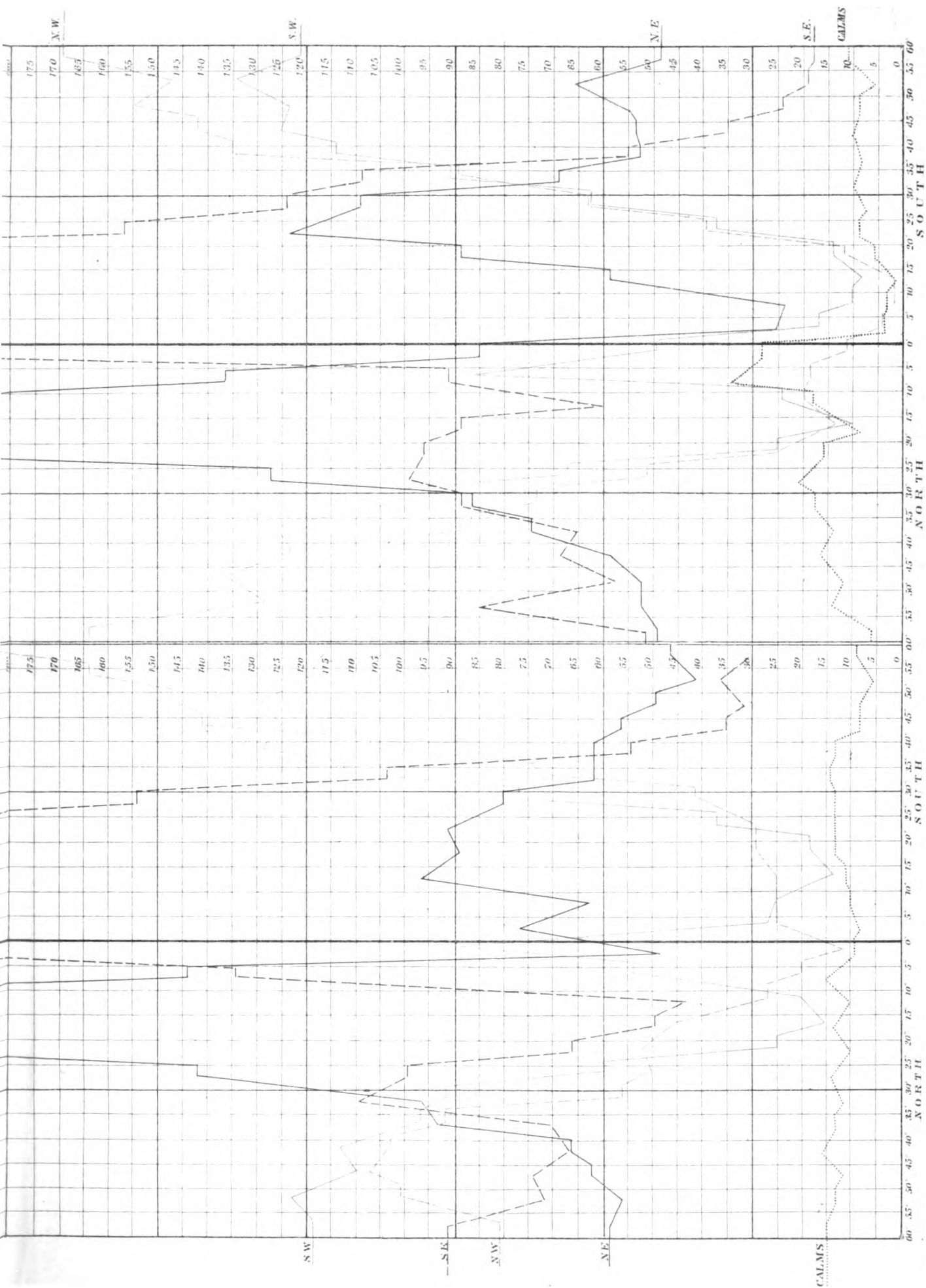
* It is usual for mariners, when speaking of currents either in the sea or air that flow in opposite directions, to allude to one set as *counter* currents, not as "*anti*" currents. Hence, in speaking of the NW. and SW. *passage* winds, I have preferred the nautical nomenclature, and called them *counter* trades. Sir John Herschel calls them anti-trades.

WINDS AND CALMS IN THE

PACIFIC OCEAN. Fig.1

ATLANTIC OCEAN. Fig.2





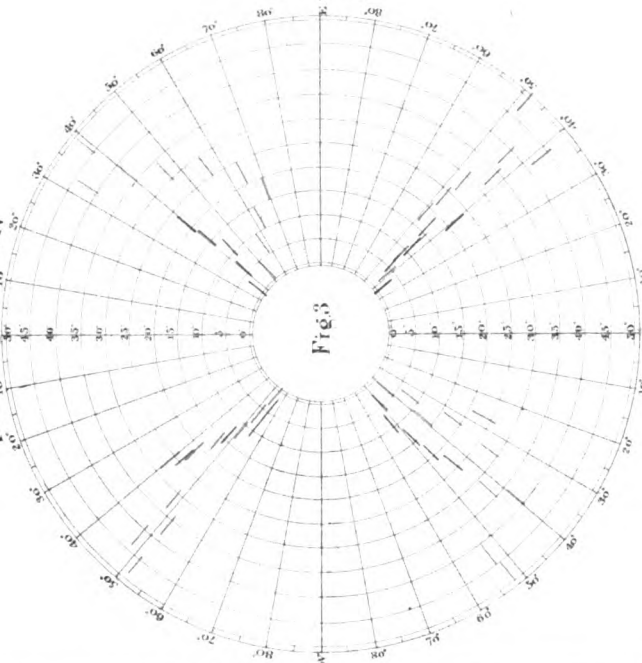
DIAGRAMS

showing the
MEAN DIRECTION OF WINDS FROM EACH QUARTER
IN THE DIFFERENT OCEANS

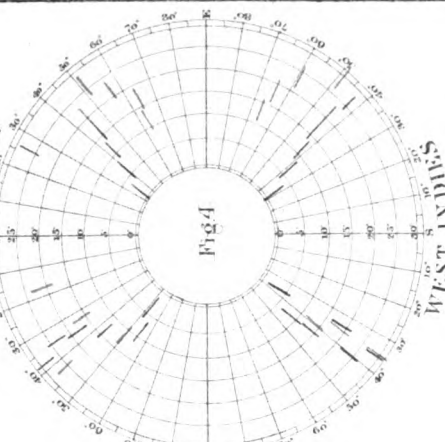
South Lat. Red. /

North Lat. Blue. /

INDIAN OCEAN

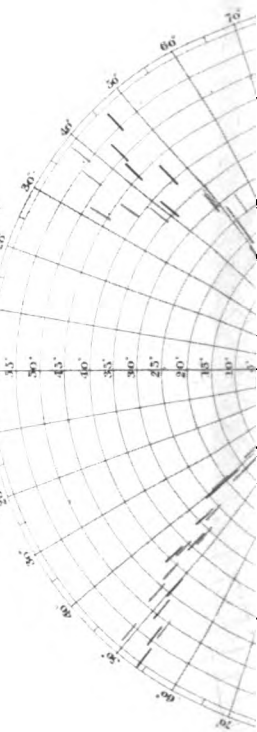


CHINA SEA &



China Sea: Blue /
West Indies: Red /

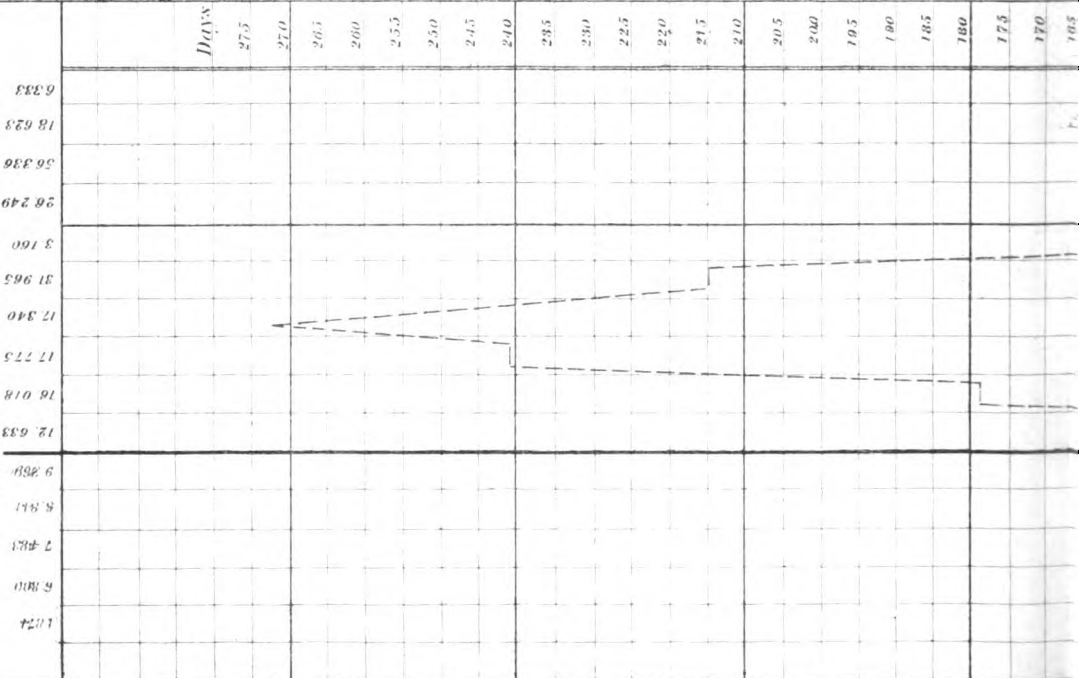
PACIFIC OCEAN

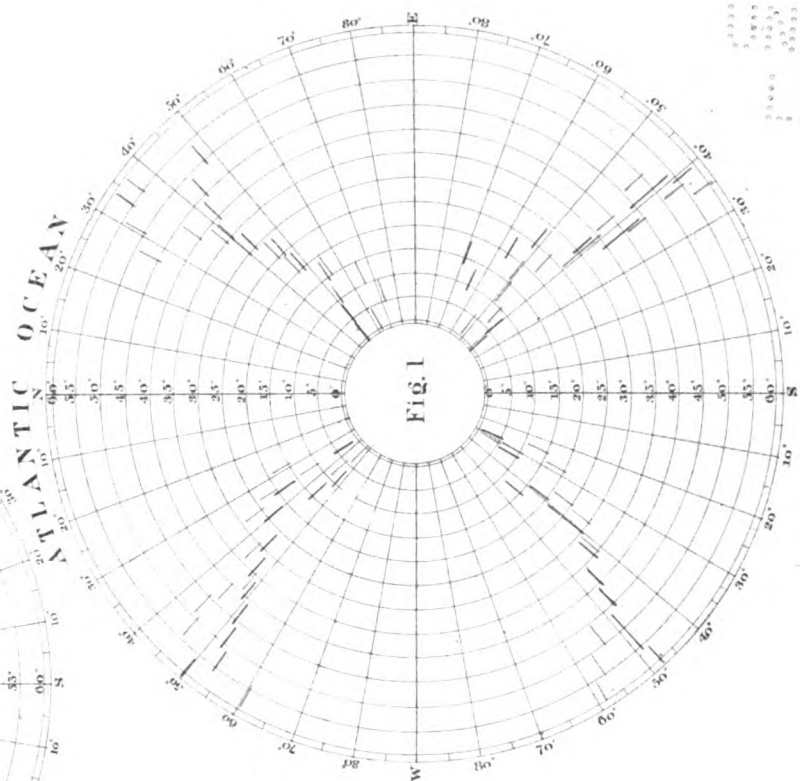
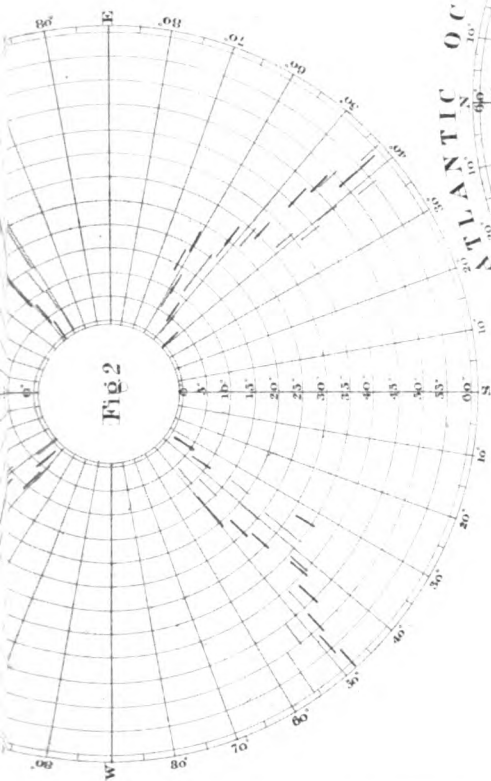
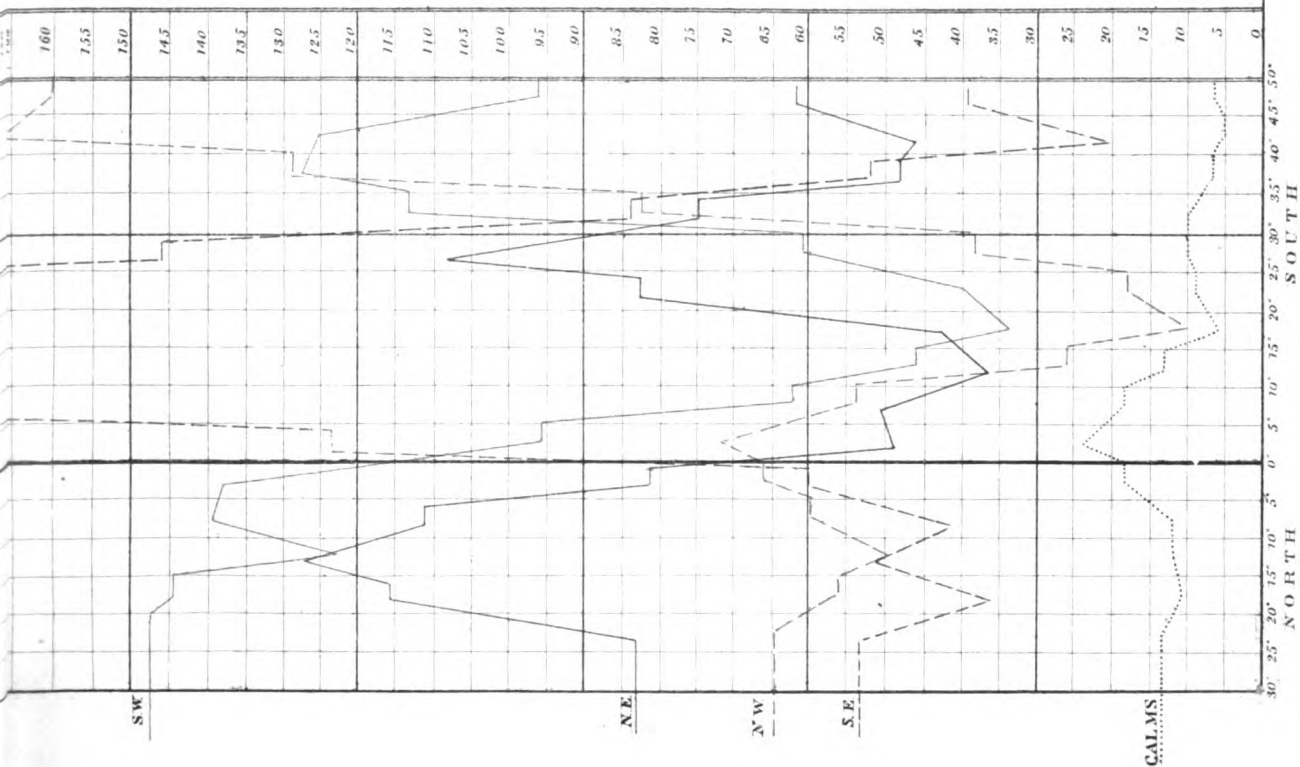


30° 25° 20° 15° 10° 5° NORTH
5° 10° 15° 20° 25° 30° 35° 40° 45° 50° SOUTH

WINDS AND CALMS IN THE INDIAN OCEAN

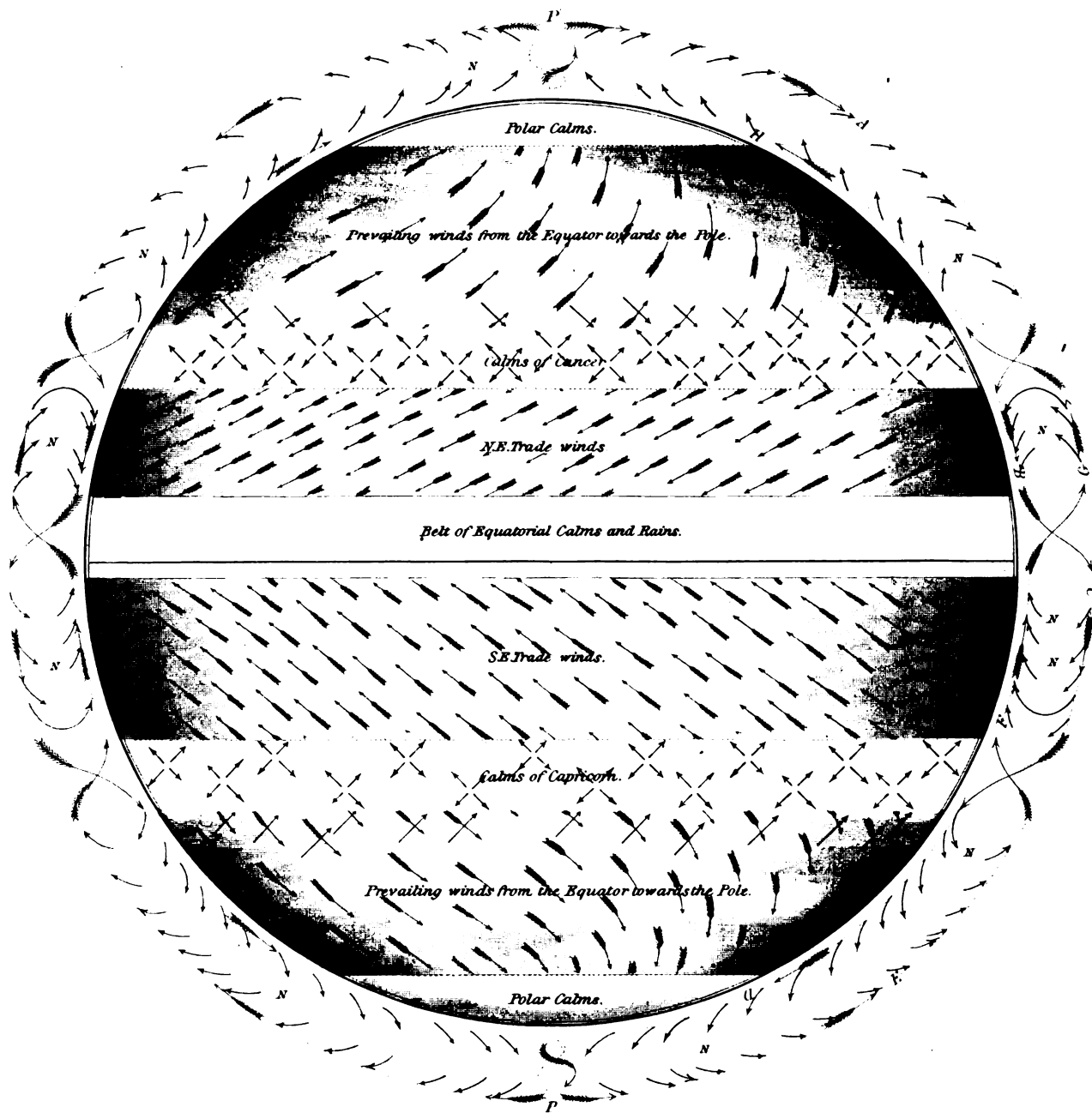
Number of Observations.





ARABULIO
VTORIVNU
VABUL

DIAGRAM OF THE WINDS.



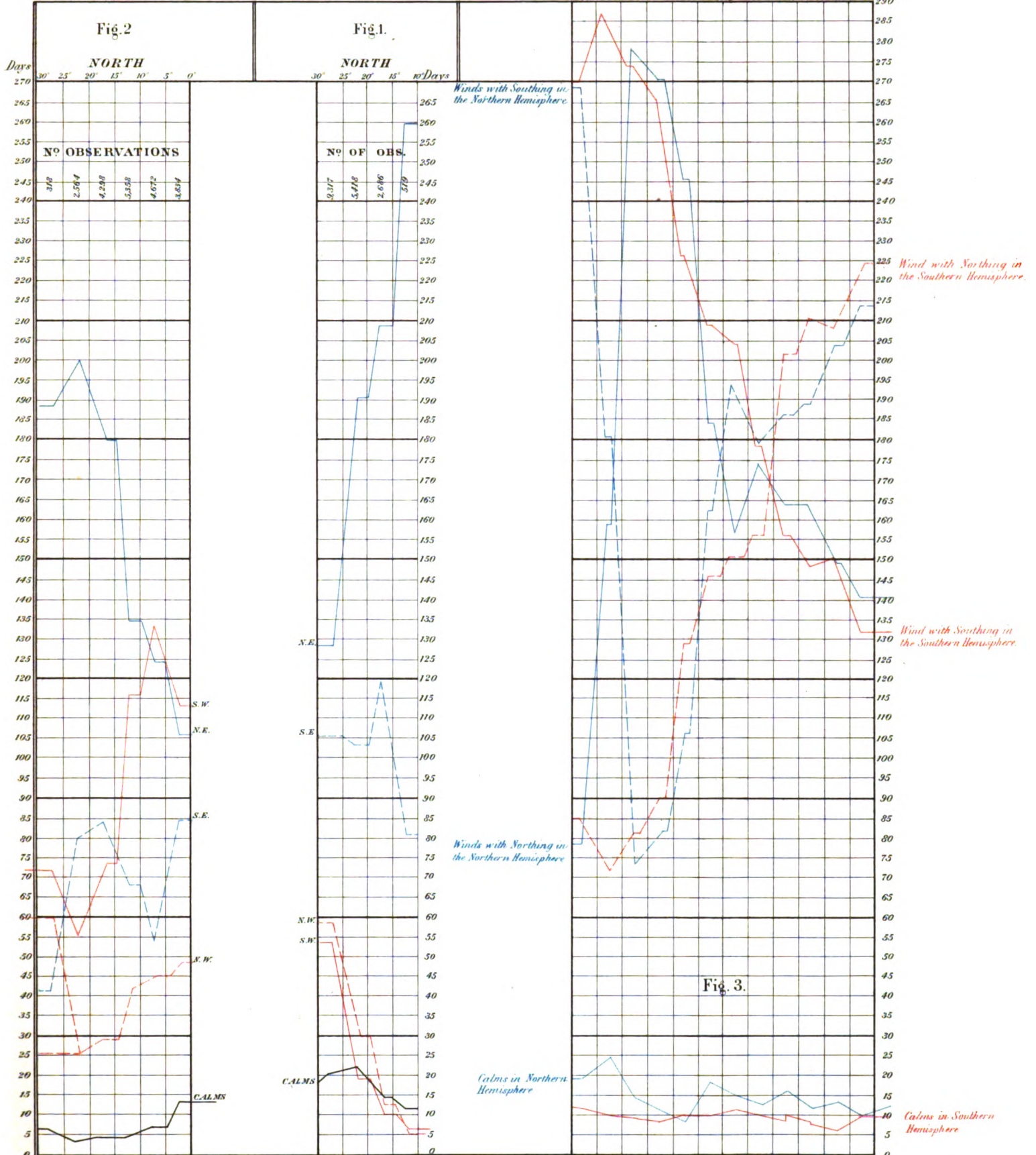
ARMILLO
YTEREYU
YRABU

CHINA SEA

WEST INDIES

Parallels of Latitude

Days



АВРИЛО
УТРАДИВ
УРАДИ

MAURY'S NAUTICAL MONOGRAPHS.

No. 2.

THE BAROMETER AT SEA.

OBSERVATORY, WASHINGTON.

MARCH 1861.

MAURY'S MONOGRAPHS, No. 2.

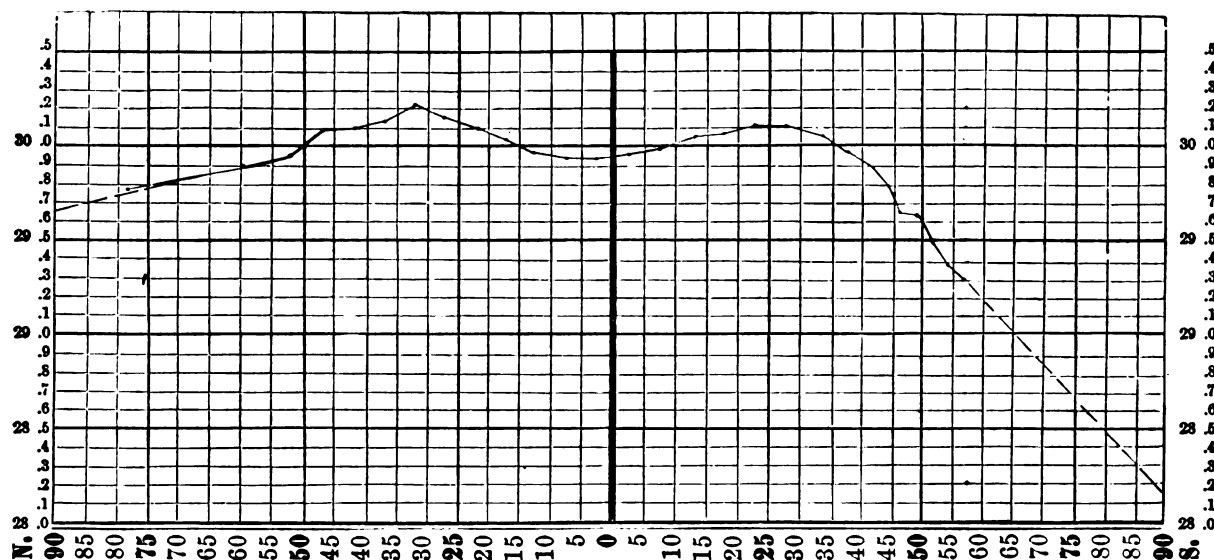
THE BAROMETER AT SEA.

According to an immense number of observations of the barometer at sea, which are recorded in the Abstract Logs, and which have been discussed at the Meteorological Institute of Utrecht, in Holland, and the National Observatory in Washington, the mean height of the barometer for the various parallels is as per subjoined table copied from "THE PHYSICAL GEOGRAPHY OF THE SEA AND ITS METEOROLOGY."*

Mean height of the Barometer at Sea.

Latitude.	Barometer.	No. of observations.	Latitude.	Barometer.	No. of observations.
Between 0° and 5° N...	29.915	5114	Between 0° and 5° S...	29.940	3692
5° and 10° N...	29.922	5343	5° and 10° S...	29.981	3924
10° and 15° N...	29.964	4496	10° and 15° S...	30.028	4156
15° and 20° N...	30.018	3592	15° and 20° S...	30.060	4248
20° and 25° N...	30.081	3816	20° and 25° S...	30.102	4536
25° and 30° N...	30.149	4392	25° and 30° S...	30.095	4780
30° and 35° N...	30.210	4989	30° and 36½° S...	30.052	6970
35° and 40° N...	30.124	5103	40° and 43° S...	29.88	1703
40° and 45° N...	30.077	5899	43° and 45° S...	29.78	1130
45° and 50° N...	30.060	8282	45° and 48° S...	29.63	1174
50° and 55° N...	29.95†	England.	48° and 50° S...	29.62	672
In 59° 51' N...	29.88	St. Petersburg.	50° and 53° S...	29.48	665
In 78° 37' N...	29.759	Dr. Kane.	53° and 55° S...	29.36	475
			In 56½° S...	29.29	1126

From this table we obtain a synoptical view in inches of the barometric weight or pressure of the atmosphere from pole to pole, as per plate:



*Sampson Low, Son & Co., London.

†Maandelijksche Zeilaanwijzingen van Java naar Het Kanaal. Als Uitkomsten Wetenschap en Ervaring Aangaande Winden en Zeestromingen in Sommige Gedeelten Van Den Oceaan Uitgegeven Door Heet Kininklijk Nederlandsch Meteorologische Institut. Utrecht, 1859.

‡The mean height of the barometer for England generally is 29.95 in.—Admiral FitzRoy.

From these data, and from the discussion of no less than 1,159,353 observations* on the winds at sea, we obtain the elements for Plate marked III, which shows the average annual duration and mean direction of the wind for all places at sea, together with the barometric profile of the atmosphere.

With these tables and plates before him, the navigator will see what the mean height of the barometer or the prevailing direction of the wind is for any latitude, and that, consequently, he is to judge of the change which is to follow, according to the difference between the observed height of the barometer in any latitude, and its mean height for that latitude. Thus, the seaman observes his barometer and finds it at 29.3 inches; now, if he be in 56° N. he "may look out for squalls," but if he be in 56° S. it is only the mean height of the barometer, or what 29.9 inches would be in 56° N.

There are, however, special rules to be observed for particular seas, and I quote special rules for the *British seas* as well as for information concerning the use of the barometer itself, from Admiral Fitz Roy's admirable little Manual published by the Board of Trade. †

"A barometer, for a coast weather glass, should," says the Admiral in his directions, "be placed where it may be seen at any time, in a good light, by fishermen, boatmen, or seafaring persons.

"It should be set regularly—by a duly authorized person—about sunrise, noon, and sunset.

"An explanatory card and a manual should be accessible near the barometer.

"In an aneroid, a metallic, or a wheel barometer, the motion of the hand should correspond to that of mercury in an independent instrument; and such substitutes should be often verified by comparison.

"The *average* height of the barometer in England, at the sea level, is about 29.95 inches, and the average temperature of air is nearly 50° .

"Add one tenth of an inch to the observed height, for each hundred feet the barometer is above the mean sea level; and for close comparison, when desired, *subtract* three hundredths of an inch for each *ten* degrees which the attached thermometer shows above 32° .

"The thermometer falls about one degree for each three hundred feet of elevation *above* about fifty feet from the ground.

"These pages may be useful to farmers and gardeners also, though, in general, wind affects them less than rain.

"EXPLANATORY OF WEATHER GLASSES IN NORTH LATITUDE.

"In other latitudes substitute the word south, or southerly, or southward, for north, &c., throughout these pages

"THE BAROMETER RISES

For northerly wind, (including from northwest, by the north, to the eastward;) for dry or less wet weather; for less wind; or for more than one of these changes:—

"EXCEPT on a few occasions when rain (or snow) comes from the northward with *strong* wind.

"For change of wind towards *any* of the above directions—

"A THERMOMETER FALLS.

"THE BAROMETER FALLS

For southerly wind, (including from southeast, by the south, to the westward;) for wet weather; for stronger wind; or for more than one of these changes:—

"EXCEPT on a few occasions when *moderate* wind with rain (or snow) comes from the northward.

"For change of wind towards the *upper* directions *only*—

"A THERMOMETER RISES.

*Physical Geography of the Sea. Harper & Brothers, New York.

†BAROMETER MANUAL. Board of Trade. Compiled by Rear-Admiral Fitz Roy, F. R. S. Third edition. London, 1860.

“Moisture, or dampness, in the air (shown by a hygrometer,) increases BEFORE or with rain, fog, or dew.

“On barometer scales the following contractions may be useful in north latitude:—

RISE	FALL
FOR	FOR
NELY.	SWLY.
NW.—N.—E.	SE.—S.—W.
DRY	WET
OR	OR
LESS	MORE
WIND.	WIND.
EXCEPT	EXCEPT
WET FROM	WET FROM
NED.	NED.

“And the following summary may be useful generally:—

RISE	FALL.
FOR	FOR
COLD	WARM
DRY	WET
OR	OR
LESS	MORE
WIND.	WIND.
EXCEPT	EXCEPT
WET FROM	WET FROM
COLD SIDE.	COLD SIDE.

“HOW TO FORETELL WEATHER.

“1. Familiar as the practical use of weather glasses is, at sea as well as on land, only those who have long watched their indications, and compared them carefully, are really able to conclude more than that the rising glass* USUALLY foretells less wind or rain, a falling barometer more rain or wind, or both; a high one fine weather, and a low the contrary. But useful as these general conclusions are *in most cases*, they are *sometimes* erroneous, and then remarks may be rather hastily made, tending to discourage the inexperienced.

“2. By attention to the following observations (the results of many years' practice, and many persons' experience,) any one not accustomed to use a barometer may [learn to use it] without difficulty.

“3. The barometer shows whether the air is getting lighter or heavier, or is remaining in the same state. The quicksilver falls as the air becomes lighter, rises as it becomes heavier, and remains at rest in the glass tube while the air is unchanged in weight. Air presses on everything within about forty miles of the world's surface, like a *much* lighter ocean, at the bottom of which we live—not feeling its weight because our bodies are full of air, † but feeling its currents, the winds. Towards any place from which the air has been drawn by suction, ‡ air presses with a force or weight of nearly fifteen pounds on a square inch of surface. Such a pressure holds the limpet to the rock, when, by contracting itself, the fish has made a place without air§ under its shell. Another familiar instance is that of the fly which walks on the ceiling with feet that stick. The barometer tube, emptied of air, and filled with pure mercury, is turned down into a cup or cistern containing the same fluid, which, feeling the weight of air, is so pressed by it as to balance a column of about thirty inches (more or less) in the tube where no air presses on the top of the column.

“4. If a long pipe, closed at one end only, were emptied of air, filled with water, the open end kept in water and the pipe held upright, the water would rise in it more than thirty feet. In this way water barometers have been made. A proof of this effect is shown by any well with a sucking pump—up which, as is commonly known, the water will rise nearly thirty feet, by what is called suction, which is, in fact the pressure of air towards an empty space.

* Glass, barometer, column, mercury, quicksilver, or hand.

† Or atmosphere, or the atmospheric fluid which we breathe.

‡ Or exhaustion.

§ A vacuum.

"5. The words on scales of barometers should not be so much regarded for weather indications as the rising or falling of the mercury; for, if it stand at *Changeable*, (29.50) and then rise towards *Fair*, (30.00,) it presages a change of wind or weather, though not so great as if the mercury had risen higher; and, on the contrary, if the mercury stands above *fair* and then fall, it presages a change, though not to so great a degree as if it had stood lower; besides which, the direction and force of wind are not in any way noticed. It is not from the point at which the mercury may stand that we are alone to form a judgment of the state of the weather, but from its *rising* or *falling*, and from the movements of immediately preceding days as well as hours, keeping in mind effects of change of *direction*, and dryness or moisture, as well as alteration of force or strength of wind.

"6. The barometer is said to be *falling*, when the mercury in the tube is sinking, at which time its upper surface is *sometimes* concave or hollow; or when the hand [as with an aneroid] moves to the left. The barometer is *rising* when the mercurial column is lengthening; its upper surface being convex or rounded; or when the hand moves to the right.

"7. In this part of the world, towards the higher latitudes, the quicksilver ranges, or rises and falls, nearly three inches—namely, between about thirty inches and nine-tenths, (30.9,) and less than twenty-eight inches (28.0) on *extraordinary* occasions; but the usual range is from about thirty inches and a half (30.5) to about twenty-nine inches. Near the line, or in equatorial places, the range is but a few tenths, except in storms, when it *sometimes* falls to twenty-seven inches. [In high southern latitudes, as off Cape Horn, the range is much greater.—M.]

"8. The sliding-scale (vernier) divides the tenths into ten parts each, or hundredths of an inch. The number of divisions on the vernier exceeds that in an equal space of the fixed scale by one.

"9. By a thermometer the *weight* of air is *not* shown. No air is within the tube. None can get in. But the bulb of the tube is full of mercury, which contracts by cold and swells by heat; according to which effect the thread of metal in the small tube is drawn down or pushed up so many degrees; and thus shows the temperature.*

"10. If a thermometer have a piece of linen or muslin tied loosely round the bulb, wetted enough to keep it *damp* by a strip or thread dipping into a cup of [fresh] water, it will show less heat than a dry one, in proportion to the dryness of the air, and quickness of drying.† In very damp weather, with or *before* rain, fog, or dew, two such thermometers will be nearly alike.‡

"11. For ascertaining the dryness or moisture of air, the readiest and surest method is the comparison of two verified thermometers—one dry, the other *just* moistened [with clean fresh water] and *kept so*. Cooled by evaporation as much as the state of the air admits, the moist (or wet) bulb thermometer shows a temperature nearly equal to that of the other one when the atmosphere is extremely damp or moist; but lower at other times—in proportion to the dryness of air and consequent evaporation—as far as twelve or fifteen degrees in this climate; twenty or even more elsewhere. From three to eight degrees of difference is usual in England; and about seven is considered healthy for inhabited rooms. The thermometers should be near each other, but not *within* three inches.

"12. The thermometer fixed or attached to a barometer, intended to be used only as a weather-glass, shows the temperature of air about it nearly, but does not show the temperature of mercury within exactly. It does so, however, near enough for ordinary practical purposes—provided that no sun, nor fire, nor lamp heat is allowed to act on the instrument partially.

"13. The mercury in the cistern and tube being affected by cold or heat, makes it advisable

* Thirty-two degrees is the point at which water begins to freeze or ice to thaw.

† Evaporation.

‡ Twice their difference, subtracted from the higher, gives the dew point (nearly.)

to consider this when endeavoring to foretell coming weather by the length of the column, and indispensable when making comparisons with other instruments.

"14. Briefly, the barometer shows weight or pressure of the air; the thermometer, heat and cold, or temperature; and the wet thermometer, compared with a dry one, the degree of moisture or dampness.*

"15. It should always be remembered that the state of the air *foretells coming* weather, rather than shows the weather that is *present*—(an invaluable fact too often overlooked;) that the longer the time between the signs and the change foretold by them, the longer such altered weather will last; and, on the contrary, the less the time between a warning and a change, the shorter will be the continuance of such foretold weather.

"16. To know the state of the air, not only barometer and thermometers should be watched, but the appearances of the sky should be vigilantly noticed.

"17. If the barometer has been about its ordinary height, say near thirty inches, at the sea level,† and is steady, or rising, while the thermometer falls, and dampness becomes less, northwesterly, northerly, or northeasterly wind, or less wind, less rain or snow, may be expected.

"18. On the contrary, if a fall takes place, with a rising thermometer and increased dampness, wind and rain may be expected from the southeastward, southward, or southwestward.

"19. A fall, with low thermometer, foretells snow.

"20. Exceptions to these rules occur when a northerly wind, with wet (rain, hail, or snow,) is impending, before which the barometer often rises (on account of the direction of the coming wind alone) and deceives persons who, from that sign only, (the rising,) expect fair weather.

"21. When the barometer is rather below its ordinary height, say down to near twenty-nine inches and a half, (at the sea level,) a rise foretells less wind, or a change in its direction towards the northward, or less wet; but when it has been very low, about twenty-nine inches, the first rising usually precedes, or indicates, strong wind—at times heavy squalls—from the northwestward, northward, or northeastward; *after* which violence a gradually-rising glass foretells improving weather, if the thermometer falls. But, if the warmth continue, probably the wind will back, (shift against the sun's course,) and more southerly or southwesterly wind will follow, especially if the barometer rise is sudden.

"22. The most dangerous shifts of wind, or the *heaviest* northerly gales, happen *soon* after the barometer *first* rises from a very low point; or, if the wind veers *gradually*, at some time afterwards.

"23. Indications of approaching change of weather, and the direction and force of winds, are shown less by the height of the barometer than by its falling or rising. Nevertheless, a height of more than thirty (30.0) inches (at the level of the sea) is indicative of fine weather and moderate winds; *except* from east to north, *occasionally*.

"24. A rapid rise of the barometer indicates unsettled weather. A slow movement the contrary; as likewise a *steady* barometer, which, when continued, and with dryness, foretells very fine weather.

"25. A rapid and considerable fall is a sign of stormy weather, and rain, (or snow.) Alternate rising and sinking indicates unsettled and threatening weather.

"26. The greatest depressions of the barometer are with gales from the SE., S., or SW.; the greatest elevation, with wind from the NW., N., or NE., or with calm.

"27. Though the barometer generally falls with a southerly, and rises with a northerly

*The two thus combined making a (Mason) hygrometer; for which, however, some kinds of hair, grass, or seaweed may be a substitute, though very inferior.

†It differs, or stands lower, about a tenth of an inch for each hundred feet of height directly upwards, or vertically, above the sea; its *average* height being 29.95 inches at the mean sea level in England; which height may be called "par" for that level. Allowances must, therefore, be made for barometers on high land or in buildings; each different elevation having its own (normal) line of pressure, or par height.

wind, the contrary sometimes occurs; in which cases, the southerly wind is usually dry, with fine weather, or the northerly wind is violent and accompanied by rain, snow, or hail; perhaps with lightning.

“28. When the barometer sinks considerably, much wind, rain, (perhaps, with hail,) or snow will follow, with or without lightning. The wind will be from the northward, if the thermometer is low, (for the season;) from the southward, if the thermometer is high. Occasionally a low glass is followed or attended by lightning *only*, while a storm is beyond the horizon.

“29. A sudden fall of the barometer, with a westerly wind, is sometimes followed by a violent storm from NW., or N., or NE.

“30. If a gale sets in from the E. or NE., and the wind veers by the south, the thermometer will continue falling until the wind is near a marked change, when a lull *may* occur; after which the gale will soon be renewed, perhaps suddenly and violently, and the veering of the wind towards the NW., N., or NE. will be indicated by a rising of the barometer with a fall of the thermometer.

“31. Three causes (at least) * appear to affect a barometer:

“32. *First*. The direction of the wind—the northeast wind tending to raise it most, the southwest to lower it the most, and wind from points of the compass between them proportionally as they are nearer one or the other extreme point.

“33. NE. and SW. may therefore be called the wind's *poles*.

“34. The range or difference of height shown, due to change of direction *only*, from one of these bearings to the other, (supposing strength or force and moisture to remain the same,) amounts in these latitudes to about half an inch (as read off.)

“35. *Second*. The amount, taken by itself, of vapor, moisture, wet, rain, or snow, in the wind or current of air, (direction and strength remaining the same,) seems to cause a change amounting in an extreme case to about half an inch.

“36. *Third*. The strength or force alone of wind from any quarter, (moisture and direction being unchanged,) is preceded or foretold by a fall or rise, according as the strength will be greater or less, ranging in an extreme case to more than two inches.

“37. Hence, supposing the three causes to act together, in extreme cases, the height would vary from near thirty-one inches (30.90) to about twenty-seven inches, (27.00,) which has happened, though rarely, (and even in *tropical* latitudes.)

“38. In general, the three causes act much less strongly, and are less in accord; so that ordinary varieties of weather occur much more frequently than extreme changes.

“39. Another general rule requires attention, which is that the wind usually *appears* to veer, shift, or go round *with the sun*, (right-handed, or from left to right,)† and that when it does not do so, or backs, more wind or bad weather may be expected instead of improvement.

“40. It is not by any means intended to discourage attention to what is usually called ‘weather wisdom.’ On the contrary, every prudent person will combine observation of the elements with such indications as he may obtain from instruments, and will find that the more accurately the two sources of foreknowledge are compared and combined the more satisfactory their results will prove.

“41. A barometer begins to rise considerably before the conclusion of a gale, sometimes even at its commencement. Although it falls lowest before high winds, it frequently sinks very much before heavy rain. The barometer falls, but *not always*, on the approach of thunder and lightning.‡ Before and during the *earlier* part of settled weather it usually stands high, and is stationary, the air being dry.

* Electrical effects are yet uncertain.

† With watch-hands in the northern hemisphere, but the *contrary in south latitude*. This, however, is only *apparent*, the wind is actually circulating in the *contrary* direction; as a circle or circular figure, turned horizontally, while moved across a map or chart will explain better than words.

‡ Thunder clouds rising from *northeastward* against the wind do not usually cause a fall of the barometer.

"42. Instances of fine weather with a low glass occur, however, rarely, but they are always preludes to a duration of wind or rain, *if not both*.

"43. After very warm and calm weather, a squall or storm, with rain, may follow; likewise at any time when the atmosphere is *heated* much above the *usual* temperature of the season, and when there is or recently has been much electric or magnetic disturbance in the atmosphere.

"44. Allowance should *invariably* be made for the previous state of the glasses during *some days as well as some hours*, because their indications *may* be affected by distant causes, or by changes close at hand. Some of these changes may occur at a greater or less distance, influencing neighboring regions, but not visible to each observer whose barometer feels their effect.

"45. There may be heavy rains or violent winds beyond the horizon and the view of an observer, by which his instruments may be affected considerably, though no particular change of weather occurs in his immediate locality.

"46. It may be repeated that the longer a change of wind or weather is foretold before it takes place, the longer the presaged weather will last; and, conversely, the shorter the warning, the less time whatever causes the warning, whether wind or a fall of rain or snow, will continue.

"47. Sometimes severe weather from the southward, *not lasting long*, may cause no great fall, because followed by a *duration* of wind from the northward; and at times the barometer may fall with northerly winds and fine weather, apparently against these rules, because a *continuance* of southerly wind is about to follow. By such changes as these one may be misled, and calamity may be the consequence if not duly forewarned.

"48. A few of the more marked signs of weather, useful alike to seamen, farmer, and gardener, are the following:

"49. Whether clear or cloudy, a rosy sky at sunset presages fine weather; a red sky in the morning, bad weather, or much wind, (perhaps rain;) a grey sky in the morning, fine weather; a high dawn, wind; a low dawn, fair weather.*

"50. Soft looking or delicate clouds foretell fine weather, with moderate or light breezes; hard edged, oily looking clouds, wind. A dark, gloomy, blue sky is windy; but a light, bright, blue sky indicates fine weather. Generally, the *softer* the clouds look the less wind (but perhaps more rain) may be expected; and the harder, more 'greasy,' rolled, tufted, or ragged, the stronger the coming wind will prove. Also, a bright yellow sky at sunset presages wind; a pale yellow, wet; and thus, by the prevalence of red, yellow, or grey tints, the coming weather may be foretold very nearly, indeed, if aided by instruments, almost exactly.

"51. Small inky-looking clouds foretell rain; light scud clouds driving across heavy masses show wind and rain; but, if alone, may indicate wind only.

"52. High upper clouds crossing the sun, moon, or stars in a direction different from that of the lower clouds, or the wind then felt below, foretell a change of wind.†

"53. After fine clear weather, the first signs in the sky of a coming change are usually light streaks, curls, wisps, or mottled patches of white distant cloud, which increase, and are followed by an overcasting of murky vapor that grows into cloudiness. This appearance, more or less oily or watery, as wind or rain will prevail, is an infallible sign.

"54. Usually, the higher and more distant such clouds seem to be, the more gradual, but general, the coming change of weather will prove.

"55. Light, delicate, quiet tints or colors, with soft undefined forms of clouds, indicate and accompany fine weather; but gaudy, or unusual hues, with hard, definitely outlined clouds, foretell rain, and probably strong wind.

* A "high dawn" is when the first indications of daylight are seen above a bank of clouds. A "low dawn" is when the day breaks on or near the horizon, the first streaks of light being very low down.

† In the tropics, or regions of trade winds, there is generally an upper and counter current of air, with very light clouds, which is not an indication of any approaching change. In middle latitudes such upper currents are not so frequent (*or evident?*) except before a change of weather.

"56. Misty clouds forming, or hanging on heights, show wind and rain coming, if they remain, increase, or descend. If they rise or disperse, the weather will improve or become fine.

"57. When sea birds fly out early and far to seaward, moderate wind and fair weather may be expected. When they hang about the land, or over it, sometimes flying inland, expect a strong wind, with stormy weather. As many creatures besides birds are affected by the approach of rain or wind, such indications should not be slighted by an observer who wishes to foresee weather.

"58. There are other signs of a coming change in the weather known less generally than may be desirable, and therefore worth notice; such as, when birds of long flight, rooks, swallows, or others, hang about home, and fly up and down or low, rain or wind may be expected. Also, when animals seek sheltered places, instead of spreading over their usual range; when pigs carry straw to their sties; when smoke from chimneys does not ascend readily, (or straight upwards during calm,) an unfavorable change is probable.

"59. Dew is an indication of fine weather; so is fog. Neither of these two formations occur under an overcast sky or when there is much wind. One sees fog occasionally rolled away, as it were, by wind, but seldom or never *formed* while it is blowing. [*Vide* Maury's Storm and Rain Charts.]

"60. Remarkable clearness of atmosphere near the horizon, distant objects, such as hills, unusually visible, or raised, (by refraction,)* and what is called 'a good *hearing day*,' may be mentioned among signs of wet, if not wind, to be expected.

"61. More than usual twinkling of the stars, indistinctness or apparent multiplication of the moon's horns, haloes, 'wind dogs,'† and the rainbow, are more or less significant of increasing wind, if not approaching rain, with or without wind.

"62. Near land, in sheltered harbors, in valleys, or over low ground, there is usually a marked diminution of wind during part of the night, and a dispersion of clouds. At such times an eye on an overlooking height may see an extended body of vapor below, (rendered visible by the cooling of night,) which *seems* to check the wind.

"63. The dryness or dampness of the air, and its temperature, (for the season,) should *always* be considered *with other* indications of change or continuance of wind and weather.

"64. On land, generally, there is more difficulty in ascertaining the real direction of the wind, in practice, than there is at sea, where sails, or a vane and a compass are always at hand, uninfluenced by heights or eddy winds.

"65. Some observers notice smoke, others clouds, (seldom going with the *local* wind *below*, though generally correct as respects the *prevailing* wind;) some mark the vane or weathercock; while only a few of the lighthouse and telegraph observers know how their points of reference bear by the world (or map) or by a magnetic needle, of which the variation is still less often known within a point of the compass, (if, indeed, understood.)

"66. Such persons should be advised to *mark* a true east and west line, *about the time of the equinox*, by the sun at rising or setting, and by it give their bearings or directions of wind; and they should take its direction from that of the *lower* clouds, (when they are not very distant,) compared with that of vanes and smoke, in preference to any other indication.

"67. Much more care is required in noticing the veering, shift, turn, or gyration of the wind than has usually been thought necessary. Very rarely has the way the wind *went round* been noticed in ordinary registers.

"68. These shiftings or veerings of wind—being caused generally by the progression of cyclonic movements of the atmosphere which succeed or counteract each other, variously impinging against air at rest, or moving differently—require much attention.

"69. With respect to the 'normal' levels, lines, or barometric heights, (namely, the *means*

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above and below which instruments range at places of various elevations,) often, indeed generally, used on the continent of Europe, it may be repeated that our word 'par' may be a useful synonym for ordinary use: thus, (say) twenty-four hundredths (or whatever it may be) above or below par.

"70. Wherever practicable, the vertical difference between any such level and that of the ocean should be ascertained, as each ten feet lowers the barometer about eleven thousandths of an inch. This sea level should be that of the ocean itself at mean half tide—a level which should be the universal standard of reference.

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"72. Like seamanship, ability to foretell weather is acquired by degrees practically, and has not been hitherto attained by books; though it may now be so, in consequence of numerous recorded observations and opinions brought together in late years, very carefully considered, and published at the lowest price by government.

"73. Instructions being thus available, based on scientific as well as practical conclusions, by such help properly studied, any one may become 'weather wise' who will notice, even once a day, the indications of the heavens, of thermometers, and of a barometrical instrument.

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"75. To know whether a tube with mercury has been well boiled (as it is called) by holding and turning it over a charcoal fire, it is unnecessary to watch the tedious process. Subsequent examination of the metal in the glass tube with a lens, and its 'click' at the *top* of the tube, give unfailing evidences of the presence or absence of air, whether boiled or otherwise treated.

"76. To verify the graduation thoroughly (not at a few casual heights *only* by comparison with another barometer) artificial pressure or exhaustion must be obtained by placing the instrument under the receiver of an air pump.

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There are also standards at the National Observatory, Washington, by which farmers and others, upon application and without charge, may have their instruments *set*.

Dividing the compass according to "the four quarters," and calling from N. inclusive to E., the first quarter; from E. inclusive to S., the second quarter; from S. inclusive to W., the third quarter; and from W. inclusive to N., the fourth quarter, we shall hereafter have a more ready reference.

Now, recollecting that the land winds are the dry winds; that aqueous vapor is lighter than atmospheric air in the proportion of three to five; that the two do not mix chemically, but only mechanically; that an atmosphere of vapor would be lighter than an atmosphere of air, and that consequently an atmosphere saturated with vapor is lighter than one without any—in other words, moist air is lighter than dry air; recollecting, also, that the westerly winds are, along the American shores of the Atlantic, the dry winds, while along the European coast they are the wet, and *vice versa* with the east winds, we shall at once perceive that the foregoing rules "HOW TO FORETELL THE WEATHER" are not quite the same on both sides of the Atlantic.

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Roy's rules to the western shores of the Atlantic, another circumstance to be taken into calculation, and that is that on the American side the dry winds are moving with the general set of the great atmospheric ocean, which in extra-tropical latitudes is from the west; whereas on the Admiral's side the dry winds are counter to that general set. Owing to this circumstance, the average force and prevalence of westerly winds, even between the same parallels, will be different on opposite sides of the Atlantic as well as of the Pacific.

In the western part of the North Atlantic Ocean, or that division of it west of 45° , and between the parallels of 40° and 50° N., the mean height of the barometer is 29.9 inches, and it appears to be indicated by my observations—as far as they have been extended and discussed in this field, where they reach about 2,500 only—that the wind hauls more frequently *with* the sun than *against* it, and that it hauls most frequently against the sun after having blown from the northward and westward. Indeed, we may state this as a general rule: that when the wind blows from the first or NE. quarter, it is as apt to haul to the fourth as to the second quarter—that is, when it is in the first quarter, it is as apt to haul with as against the sun; when it is in the second quarter, the chances are about three to one that it will haul to the SW., or with the sun; when it is in the third quarter, the chances are about four to one that it will haul into the fourth and not into the second quarter—that is, *with*, not *against*, the sun; but when it is in the fourth quarter, then it is most apt to haul *against* the sun and go back to the third or SW. quarter.

The following table has been compiled from our Magazine of Logs, by Lieut. Kennard:

Mean height of the barometer between the parallels of 40° and 50° N., in the Atlantic west of 45° W.

Seasons.	Wind from									
	1st quarter, or N. to E.	No. of observations.	2d quarter, or E. to S.	No. of observations.	3d quarter, or S. to W.	No. of observations.	4th quarter, or W. to N.	No. of observations.	Mean.	Total observations.
	<i>Inches.</i>		<i>Inches.</i>		<i>Inches.</i>		<i>Inches.</i>			
Winter	30.03	98	29.98	40	29.86	153	29.85	300	29.89	591
Spring	29.92	116	29.87	121	29.86	272	29.78	258	29.84	767
Summer	29.98	110	30.04	114	29.89	330	29.91	175	29.93	729
Fall	29.98	82	29.98	50	29.92	141	29.92	212	29.94	485

THE WIND ALWAYS BLOWS FROM THE PLACE OF THE HIGH TO THE PLACE OF THE LOW BAROMETER.—The sparks are not more prone to fly upwards than are the winds to obey this law. Nevertheless, in all the stormy seas gales of wind frequently occur when the barometer is above the mean height, though tornadoes and hurricanes never, unless it be below.

The low barometer off Cape Horn has been treated of in the Sailing Directions and other works on navigation. In order to ascertain whether this diminished atmospheric pressure might be local and peculiar to Cape Horn regions, or whether it be common to all longitudes in high southern latitudes, the austral seas south of 40° S. were, in order to conduct the investigation, divided into three segments: 1st, from the meridian of the Cape of Good Hope to Melbourne, or from 20° W. to 140° E.; 2d, from Melbourne to Cape Horn regions, or from 140° E. to 80° W.; and 3d, from 80° W. to 20° W., or the Cape Horn regions.

Lieuts. Warley and Young undertook this investigation in March, 1860, and the following tables show the results as afforded by 6,945 observations:

Mean height of the barometer in high southern latitudes.

And between the parallels of	As observed between the meridians of—							
	20° W. and 140° E.		140° E. and 80° W.		Off Cape Horn.		Mean of all.	
	No. of obser- vations.	Barometer.	No. of obser- vations.	Barometer.	No. of obser- vations.	Barometer.	No. of obser- vations.	Barometer.
		<i>Inches.</i>		<i>Inches.</i>		<i>Inches.</i>		<i>Inches.</i>
40° S. and 43° S.....	1,115	29.90	210	29.84	378	29.86	1,703	29.88
43° S. and 45° S.....	738	.80	155	.73	237	.75	1,130	.78
45° S. and 48° S.....	611	.58	226	.71	337	.68	1,174	.63
48° S. and 50° S.....	175	.53	247	.56	250	.61	672	.57
50° S. and 53° S.....	108	.35	198	.45	359	.56	665	.48
53° S. and 55° S.....	6	.17	92	.35	377	.37	475	.36
S. of 55°.....	7	.27	64	.42	1,055	.28	1,126	.29

This table shows that the low barometer is not peculiar to Cape Horn regions, but that it is common to the austral regions generally.

Now, since the barometer at every place stands lower in the rainy than it does in the dry season, and since the great waste of waters on the polar side of 40° S. embraces a region of copious precipitation, this low barometer may be ascribed to the effects upon that instrument of the moisture which is supplied to the air by those waters.

The barometer being treated in a psychrometrical aspect, may indicate to us the seasons of most and of least rain in the unknown regions of the south.

In the subjoined tables we have, as nearly as such a limited number of observations will give, the mean monthly height of the barometer in each one of those watery regions of the south.

Mean of 3,260 barometrical observations south of 40° S., and between the meridians of 20° W. and 140° E.

Between the parallels of	Observations.	January.	Observations.	February.	Observations.	March.	Observations.	April.	Observations.	May.	Observations.	June.	Observations.	July.	Observations.	August.	Observations.	September.	Observations.	October.	Observations.	November.	Observations.	December.
40° and 43° S..	110	29.81	81	29.75	111	30.01	69	29.86	93	29.82	95	29.78	129	29.81	72	29.96	84	29.67	40	29.93	60	29.76	171	29.66
43° 45°.....	62	29.62	65	29.80	59	29.74	46	30.05	43	29.86	25	29.72	58	29.89	67	29.93	55	29.96	37	29.79	99	29.74	142	29.74
45° 48°.....	80	29.30	19	29.62	87	29.51	41	29.54	20	29.43	26	29.51	60	29.61	49	29.55	32	29.72	26	29.78	96	29.65	75	29.51
48° 50°.....	21	29.54	9	29.71	13	29.57	24	29.54	10	29.45	20	29.44	14	29.36	5	29.80	.....	.....	4	29.47	24	29.37	31	29.42
50° 53°.....	34	29.50	1	29.30	.....	.....	11	29.44	5	29.26	7	29.20	18	29.16	.....	.....	.....	.....	.....	15	29.25	17	29.39	.....
53° 55°.....	.....	.....	1	29.00	.....	.....	.....	.....	.....	.....	.....	.....	3	29.50	.....	.....	.....	.....	.....	1	28.10	1	29.40	.....
S. of 55°.....	.....	.....	6	29.31	.....	.....	.....	.....	.....	.....	.....	.....	1	29.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Mean of 1,194 barometrical observations south of 40° S., and between the meridians of 140° E. and 80° W.

Between the parallels of	No. of observations.	January.	No. of observations.	February.	No. of observations.	March.	No. of observations.	April.	No. of observations.	May.	No. of observations.	June.	No. of observations.	July.	No. of observations.	August.	No. of observations.	September.	No. of observations.	October.	No. of observations.	November.	No. of observations.	December.
40° and 43° S..	26	29.80	17	29.91	4	29.95	23	29.78	23	29.73	10	30.18	19	29.82	14	29.65	8	30.04	24	29.96	13	29.67	29	29.72
43° 45°	9	29.81	20	29.88	10	29.83	14	29.54	18	29.80	12	30.21	10	29.82	7	29.78	13	29.71	9	29.75	10	29.40	23	29.43
45° 48°	27	29.89	27	29.51	7	29.37	31	29.63	29	29.66	24	29.83	21	29.59	14	29.77	17	29.91	10	29.75	7	29.68	12	29.81
48° 50°	30	29.41	31	29.74	16	29.32	52	29.71	23	29.46	16	29.65	13	29.85	18	29.91	19	29.80	17	29.55	3	29.72	9	29.64
50° 53°	18	29.41	24	29.59	8	29.36	20	29.65	13	29.10	13	29.94	4	29.30	33	29.66	14	29.42	17	29.39	12	29.36	22	29.81
53° 55°	10	29.47	9	29.18	4	29.92	14	29.60	4	29.24	12	29.66	2	29.11	2	29.61	6	29.13	3	29.03	13	28.96	13	29.15
S. of 55°	6	29.23	11	29.27	2	29.00	10	29.21	5	27.69	7	29.94	13	29.80	.....	.....	1	28.90	.....	.....	3	29.05	6	29.05

Mean of 2,503 barometrical observations south of 40° S., and between the meridians of 80° W. and 20° W., or in the Cape Horn regions.

Between the parallels of	No. of observations.	January.	No. of observations.	February.	No. of observations.	March.	No. of observations.	April.	No. of observations.	May.	No. of observations.	June.	No. of observations.	July.	No. of observations.	August.	No. of observations.	September.	No. of observations.	October.	No. of observations.	November.	No. of observations.	December.
40° and 43° S..	21	29.85	35	29.93	34	29.94	33	29.82	41	29.78	30	29.78	33	29.98	28	29.93	30	29.89	26	29.87	40	29.84	27	29.80
43° 45°	9	29.60	22	29.74	29	29.84	19	29.70	41	29.73	18	29.66	20	29.83	11	29.97	19	29.77	17	29.87	15	29.60	17	29.72
45° 48°	21	29.61	27	29.70	34	29.73	29	29.72	40	29.55	26	29.76	29	29.61	20	29.84	26	29.78	26	29.78	37	29.40	22	29.60
48° 50°	13	29.46	26	29.54	20	29.73	18	29.56	23	29.65	20	29.83	17	29.74	17	29.66	21	29.69	20	29.70	29	29.37	26	29.55
50° 53°	22	29.44	45	29.57	38	29.46	24	29.75	50	29.57	17	29.58	26	29.30	24	29.60	24	25.53	23	29.49	29	29.23	37	29.43
53° 55°	24	29.33	24	29.43	34	29.26	32	29.49	42	29.35	27	29.45	48	29.33	27	29.47	33	29.50	27	29.30	26	29.00	33	29.47
S. of 55°	37	29.27	48	29.28	54	29.34	56	29.33	83	29.43	44	29.25	54	29.62	29	29.25	42	29.17	33	29.33	49	29.08	36	29.41

It would appear from these tables that the austral winter months, June, July, and August, are the months of the highest mean barometric range, and therefore the months in which there is less moisture in the atmosphere and less precipitation from it. Other physical facts are corroborative of this.

What is the mean height of the barometer in gales of wind on the polar side of 40° S., classed according to the four quarters? Many navigators complain of the barometer as an useless instrument off Cape Horn, and the answer to this question will be instructive to them and suggestive to all. The following table is compiled from observations all the way round, viz: from 20° W. to Australia, thence to 80° W., and then through the Cape Horn regions. It also is the work of Lieutenants Warley and Young.

Mean height of barometer as observed in 1,429 gales of wind south of the parallel of 40° S.

Between the parallels of	Observations.	Barometer, first quarter.	Observations.	Barometer, second quarter.	Observations.	Barometer, third quarter.	Observations.	Barometer, fourth quarter.
40° and 43° S.....	36	29.86	17	29.59	88	29.65	116	29.50
43° 45° S.....	30	29.58	11	29.59	72	29.49	88	29.50
45° 48° S.....	38	29.42	24	29.51	98	29.48	169	29.38
48° 50° S.....	25	29.35	10	29.46	63	29.33	88	29.27
50° 53° S.....	29	29.46	11	29.34	59	29.34	70	29.18
53° 55° S.....	15	29.31	5	29.07	60	29.23	39	29.19
S. of 55°.....	22	29.24	6	29.45	62	29.17	78	29.14

This table shows that on the polar side of 40° S., 80 per cent. of the gales of wind have westing in them, and that they come from the four quarters in the following proportions: From the Northward and Eastward 6 per cent., from the Southward and Eastward 14 per cent., from the Southward and Westward, 35 per cent., and from the Northward and Westward, 45 per cent., consequently the fourth is the stormy quarter in this region.

In the North Atlantic, gales of wind frequently occur when the barometer is above its mean height, and so they do here.

The North Atlantic, on the polar side of 40° N., is the most stormy sea in the world, and most of the gales there occur with the barometer above 29.50 in. By this table it appears that the mean height of the barometer on the polar side of 40° S. is, when it is storming, only a little below its general average.

There is a great diversity of opinion among navigators concerning the utility of the barometer off Cape Horn and in high southern latitudes generally. Many clever seamen maintain that it is utterly useless there. This arises from the circumstance that they do not take into consideration the fact that the mean barometrical pressure in high southern is very much less than it is in high northern latitudes.

We may ascend the Andes until we reach a height where the mean pressure of the superincumbent atmosphere may be measured by a column of mercury but twenty inches high. Yet no one will pretend that the barometer is of no use as a weather guide on the mountains, where its mean height is very much less than it is on the plains below.

For every place its indications are to be judged according to the difference between the observed and the mean height; and we have shown by the table (page 1) that this mean height varies with the latitude; it also varies with the rainy season of each place. If it be recollected that the mean height of the barometer off Cape Horn is about half an inch (0.5 inch) less than it is in corresponding latitudes north; that when the barometer stands at 29.50 inches in 50° S., it means about the same as it does when it stands at 30 inches in 50° N., there would be less difference of opinion on the subject. *It is just as useful in high southern latitudes and its indications are as reliable there as they are in any part of the world.*

I quote the following very excellent remarks furnished by Admiral FitzRoy from the abstract log of the Pizarro, Captain Sweet, 1860.

“*March 16.* We are once more fairly round Cape Horn, and though the nineteenth time for me, I do not see a cent’s worth of difference in the weather and glass between high southern and high northern latitudes.

“As for the weather, I certainly feel justified in giving my humble opinion; for, as an officer, I always noticed the weather when I could not the glass. In fact, I do not see *why* there should

be any difference, the *poles* are the same, (*south* corresponding to *north*, they being only the distinguishing names given by man.) But Cape Horn has got a bad name, and we know how a *bad* name will *stick* to anything.

"*July 11.* I was certainly rather taken aback with the gale this day, though I had double reefed, not for the actual pressure of the wind at the time, but because a very dark night coming on and looking rather greasy, and the mercury tumbling down, I thought it prudent; and having Cunningham's splendid reefing topsails we could soon hoist them up again with very little trouble. My experience did not lead me to suppose that the wind was going to haul round from NE. by E. to W.SW.; but this easterly wind could only have been a 'spirt' or squall, as it proved, or I think the mercury would have risen. Now, had the wind been more northerly, I should have been perfectly sure of what was coming and what *did* come. These gales are generally preceded by a preliminary breeze or 'spirt,' especially SW. gales in the South Atlantic, and NW. gales in the North Atlantic; but from some other point of the compass. Now, if we look at the amount of mercury fallen—nearly an inch, in twelve hours, from its previous steady fine weather range—we must see that the equilibrium of the atmosphere was rapidly changed, and expect a like change in the weather. How beautifully the glass indicated all this! I cannot imagine how people can condemn it, for, the more I study it, the more valuable it becomes; indeed, I never saw it fail yet. There is one thing, I believe, very often fails, and that is one's judgment, and, of course, the glass gets the blame, for it is generally very difficult to make oneself believe himself to be wrong. As an illustration: I was with a captain who used to look at the glass *only* when the weather looked threatening, which, of course, was very little guide to him then, and consequently he said it was useless, &c., &c. Unless one keeps a regular register of it, I do not believe he is at all fit to give an opinion, for it requires constant and diligent watching to become perfectly acquainted with it and understand it. There are many say that the barometer always accompanies the change of the weather, never precedes it. If the mercury is very sudden in its movements the change of weather will be sudden likewise, but I always find that the mercury begins first. If we allow their assertion, I think it does not lower the value of the glass *one item*; for those who believe so, and see the mercury tumbling down and weather indicating a change, which it always does, will surely take time by the forelock and get their ship snug. I merely state these remarks to endeavor to prove the value of the glass and how it gets a bad name.

"There was one very remarkable thing in this gale, viz: after we wore ship we had one terrific sea from NE. The mate called it a 'tripper,' and said he had sometimes encountered similar seas in the channel, of which he was acquainted, having been in the coasting trade for some time. Perhaps what he had met with was a kind of 'tidal wave,' and a small vessel would feel it; but from whatever cause, the one we encountered, we can all vouch for it, was a 'ripper,' for every soul rushed out of the fore-castle and said they certainly thought the bows were stove in. In fact it was really a terrific blow, and I wonder that the ship stood it without accident. Going to my chronometer it had actually turned a complete somers-et, but the most singular part of it was only the *one* sea! At the time we were going five knots and under close reefs."

Observations have shown that there are waves in the atmosphere as well as in the sea. They traverse oceans, and go from continent to continent. From crest to crest they measure hundreds, perhaps, thousands of miles. Now, if we only knew the barometric pressure at the crest and in the trough, and the distance between crest and hollow of such waves, it would be as easy to compute the force and velocity of the wind as it is for the engineer, the head of water being given, to compute the discharge and force of the jet. This cannot be done for the sea, but the magnetic telegraph places it within our power to do it for the land, and to give warning of the coming storm to the shipping in ports, to the shipping in the offings, to farmers on shore, to travelers, and in fact to all who are concerned in a foreknowledge of the weather—and that's everybody.

The extent of the United States, the reach of the magnetic telegraph, the ubiquity of newspapers, and the activity of the Associated Press, afford rare facilities for inaugurating such a system of observations in this country for the benefit, not only of its commerce and navigation, but for the hygeia of the people, and their industrial pursuits, including the great business of agriculture.

I have for many years been advocating the inauguration in this country of a system of daily weather reports by telegraph, and of a system of agricultural meteorology, together with the expansion of our plan of coöperation at sea. I yet hope my fellow-citizens will second me in the move, and procure for it from Congress the encouragement it deserves.

It will be observed by the accompanying letter, written in reply to certain interrogatories of her Majesty's Commissioners on English light-houses, &c., that both Great Britain and France, as well as Holland, are already in this magnificent field of research. We *might* have been the leaders in it; "but it is never too late to do good," and we shall be happy to follow in a path of usefulness and honor already made plain by those great and enlightened nations.

"OBSERVATORY, WASHINGTON, *December 15, 1860.*

"SIR: In reply to the circular letter of the 'Royal Commission on Light-Houses,' &c., requesting information on certain points connected with the subjects before them, I beg leave to address myself to their 23d question.* In answer to that I have the honor to state:

"That a system of daily weather reports by telegraph has been adopted by England and France acting in concert, which promises to be of great advantage in giving warning of approaching changes of weather, especially of those wide-spread and devastating storms which so often visit the British islands. This system has been but recently adopted; indeed it is not yet fairly underway; but the perfection to which it has been carried in Holland, and on a much less comprehensive scale; the nature of the problems connected with it, together with the character of the men charged with giving it practical effect, justify the sanguine expectations on the part of those who are striving to lessen the dangers of navigation.

"For full information as to the system in all its details, as far as it has yet been carried, I beg leave to refer the Commissioners to Admiral FitzRoy, R. N., of the Meteorological Department of the Board of Trade and Admiralty, who is specially charged with the subject in England. The information most desirable to passing ships, as well as to ships in the offings and ports, would be that relating to the coming storm, and the approach of good weather after it, with the direction of the wind, &c.

"There occurs annually in English waters, and within signal distance of British shores, an amount of shipwreck and disaster that is truly appalling. A single storm has been known to wreck or damage several hundred sail, and to destroy many lives.

"Now, most of the storms of this class, modern research has shown have their line of march. Taking up this line at one place, one of these storms may, and not unfrequently does, occupy one, two, three, or more days in traversing the region over which the indefatigable chief of the Meteorological Department of the Board of Trade has posted his *sentinels* upon the weather, as his telegraphic observers may be called. As soon as his outposts are properly occupied, and his plans completed, he will be able to give warnings, timely warnings, of the approach, if not of every one, at least annually of several of these storms. And in all such cases, whether they be many or few, a greater boon could not be rendered to commerce and navigation, than by communicating this warning to the shipping in the ports of the realm and off its coasts, through bulletin boards and suitable places in the ports themselves, and by signals from prominent light-houses, in the manner suggested by the interrogatory of the Commission.

"It is difficult to enforce by argument what is obvious to reason; but I may be pardoned for illustrating the advantages which the use of the telegraph, as a meteorological implement, and

*"23d. Supposing the telegraph to be extended to certain light-houses and light-vessels at salient points of the coast, what is the meteorological information which it would be most desirable to transmit to passing ships, and how and in what form could it be most readily received and communicated by light-keepers?"

which the warnings by signal, in the manner proposed, promise to afford to shipping. In the first part of last October—I believe the 5th, [3d] for I now speak from memory—no less than five of the fleet of steamers that ply between the shores of Great Britain and the Baltic perished, themselves and their crews, in the same gale of wind. They all put out from Hull the same day for St. Petersburg, and not one of them has been heard of since. There is scarce room left for doubt, that if Admiral FitzRoy's cordon of weather sentinels had then been in proper training—there is scarce room left for doubt, that if the gallant Admiral had had time to perfect the system of daily weather reports which at the moment he was actually arranging, and with the perfecting of which he is still engaged; there is, I venture to repeat, no doubt if this admirable plan had been brought to the perfection which time and experience are sure to impart to it, those ill-fated vessels might have been warned of the impending danger either before leaving port, or while yet within light-house signal distance of the British shores.*

“What system of signals should be adopted by which the light-houses may warn the shipping in the offings to seek shelter cannot be now as well discussed as perhaps it may after we shall have learned, by actual experience, what is the precise character of the warning which the system may enable us to give.

“But as France and England are carrying on this system of telegraphic meteorology in concert, and as other maritime powers also will no doubt unite in giving it both efficiency and effect, it would appear that the code of signals should not only be as simple as possible, and convenient, but the signals themselves should be such also as to the marine of all countries shall prove equally convenient. So that when the signal to ‘seek shelter’ is made by the light-houses of any coast, it should be alike intelligible to all vessels of every flag. Not only so; the vessels themselves, as they fly for shelter, should each be required to repeat the signal as she flies; thus giving warning of the impending danger to others which may be beyond the reach of the light-house signal. And this ‘flying’ signal, again, to be effectual, should, like that for a pilot or of distress, be simple; it should be capable of being readily made by means that are common to all vessels.

“Our knowledge of meteorological phenomena and laws is to be increased precisely as the area is increased over which a united system of daily observations, of friendly coöperation and research, is extended. In this view, it is not only desirable that every country should assist in bringing the magnetic telegraph into the service of this science, and through it into the service of navigation, (indeed, into the service of the whole human family in its daily avocations, in its going out and its coming in,) but it is also desirable that the system of general coöperation, which, at the recommendation of the Brussels Conference, has been adopted for the sea, (two thirds of the earth's surface,) should be extended so as to embrace the land likewise. There can be no doubt that our knowledge of the laws which govern the shoreless ocean on the bottom of which man has his habitation is to be enhanced as more and more of it is subjected to systematic observation and discussion. As this knowledge advances, so will the value of this new code of signals by telegraph and lighthouse be enhanced in the cause of humanity.

“Great Britain, more than any other nation, has practically the greatest interest at stake in this proposed application of light-houses to the purposes of meteorology. She curtains the western coast of Europe; she is its great commercial center. All vessels sailing abroad on the Atlantic from any of the continental ports between Ushant and the White Sea pass her offings on the outward voyage, and take departure from her cliffs. On the homeward passage the first land-fall is some British light-house, headland, or islet. Moreover, those islands, unlike the coasts of any other of the great maritime nations, present in every gale that visits them a lee shore.

* While these pages are passing through the press intelligence is received of the storm which visited the British shores 9th ultimo. It was very destructive. Many vessels perished at their anchors. The newspapers tell us that this opinion, as to the advantages of this new plan of meteorological inquiry, has been already vindicated, for that Admiral FitzRoy was enabled to give warning of this storm, three days in advance, to the principal shipping ports of the realm.—*March*, 1861.

So that it is of more importance to the commerce of the world that Great Britain, in preference to any other nation, should take the lead in encouraging this branch of meteorology, in bringing the magnetic telegraph into play as an adjunct of navigation, and in causing the light-houses to utter its warnings to vessels as they pass.

“Having, by extending these researches, acquired the ability to give warning from the light-houses of the approaching storm, and failing to use them for the purpose, would be like surveying a dangerous shoal or reef in the ‘fair way’ of some one of her ports, and then failing to publish a chart of it; or like publishing a chart, as of the harbor of Liverpool, and then failing to mark out its channel-way and dangers by beacons or buoys.

“As beacons or buoys are used to mark out invisible dangers in the water, so, with equal propriety, may the light-houses and light-vessels be used to give warning to mariners of dangers in the air equally invisible, but none the less real for that.

“There is another reason why Great Britain, perceiving the advantages of the measure, should not be slow in giving it effect in her own waters; and that is, her vessels, seamen, and subjects, more than those of any other nation, frequent all the trading ports of the world. Her example in all that tends to benefit commerce or improve navigation is of great influence among other nations. Let her adopt this plan for her own coasts, and distant countries, heeding this influence, will not be slow to follow after and adopt it for theirs also; and thus British shipping will have the full benefits of the system abroad as well as at home.

“Pray pardon me for urging with so much earnestness a subject which I am sure sufficiently commends itself without argument to the favorable consideration of her Majesty’s Commissioners. In my humble way, I have been advocating the establishment of a similar system of weather reports and telegraphic warnings, not only for the shipping, but for the farmers also of the United States; and the action which the royal commissioners may recommend her Majesty’s government to take in the premises will not be without its influence in the United States.

“Respectfully, &c.,

M. F. MAURY, U. S. N.

“J. F. CAMPBELL, Esq.,

“*Secretary Royal Commission on Light-houses, &c.,*

“*7 Millbank street, Westminster, London.*”

With the data contained in the table (page 1) I have, to deduce the mean height of the barometer for every latitude, drawn, on a table of engraved squares, a curve that would best represent the mean barometric heights of that table. Thus, the mean barometric pressure *at sea*, for every 5° of latitude from the equator to 70° north and south, is given in the table below. These figures have been, also, engraved on the Track Charts, for it is of great importance that the navigator should always know the average height of the barometer for his latitude, wherever he may be. Knowing that, he can always better judge of wind and weather by its indications:

Mean height of the barometer at sea, determined from 100,000 observations.

North Lat.	Barometer.	North Lat.	Barometer.	South Lat.	Barometer.	South Lat.	Barometer.
	<i>Inches.</i>	°	<i>Inches.</i>		<i>Inches.</i>	°	<i>Inches.</i>
Equator.	29.92	40	30.11	Equator.	29.92	40	29.92
50	29.91	45	30.05	50	29.96	45	29.75
10	29.94	50	30.00	10	30.00	50	29.55
15	29.99	55	29.99	15	30.05	55	29.34
20	30.05	60	29.88	20	30.09	60	29.15
25	30.12	65	29.84	25	30.11	65	28.96
30	30.18	70	29.80	30	30.08	70	28.69
35	30.16			35	30.02		

The following table on Baily's formula is copied from the article METEOROLOGY, by J. F. W. Herschel, in the MANUAL OF SCIENTIFIC ENQUIRY, p. 168-9, in which " β , β' " represent the height of the barometer as read off at the *lower* and *upper* stations respectively in parts of any one scale; t , t' the temperatures in degrees of Fahrenheit's thermometer at the same respective stations of the air, as shown by the detached thermometer; τ , τ' the temperatures (also in degrees Fahrenheit) of the mercury at the same stations, as shown by the attached thermometer:"

Thermometers in open air.				Thermometers attached to the barometer.		Latitude of place.	
Argument = $t + t'$.				Argument = $\tau - \tau'$.		Argument = ϕ	
$t + t'$	A.	$t + t'$	A.	$\tau - \tau'$	B.	ϕ	C.
0		0		0		0	
40	4.76891	102	4.79860	0	0.00000	0	0.00117
42	4.76989	104	4.79953	1	0.00004	5	0.00115
44	4.77089	106	4.80045	2	0.00009	10	0.00110
46	4.77187	108	4.80137	3	0.00013	15	0.00100
48	4.77286	110	4.80229	4	0.00017	20	0.00090
50	4.77383	112	4.80321	5	0.00022	25	0.00075
52	4.77482	114	4.80412	6	0.00026	30	0.00058
54	4.77579	116	4.80504	7	0.00030	35	0.00040
56	4.77677	118	4.80595	8	0.00035	40	0.00020
58	4.77774	120	4.80687	9	0.00039	45	0.00000
60	4.77871	122	4.80777	10	0.00043	50	9.99980
62	4.77968	124	4.80869	11	0.00048	55	9.99960
64	4.78065	126	4.80958	12	0.00052	60	9.99942
66	4.78161	128	4.81048	13	0.00056	65	9.99925
68	4.78257	130	4.81138	14	0.00061	70	9.99910
70	4.78353	132	4.81228	15	0.00065	75	9.99900
72	4.78449	134	4.81317	16	0.00069	80	9.99890
74	4.78544	136	4.81407	17	0.00074	85	9.99885
76	4.78640	138	4.81496	18	0.00078	90	9.99883
78	4.78735	140	4.81585	19	0.00083		
80	4.78830	142	4.81675	20	0.00087		
82	4.78925	144	4.81763	21	0.00091		
84	4.79019	146	4.81851	22	0.00096		
86	4.79113	148	4.81940	23	0.00100		
88	4.79207	150	4.82027	24	0.00104		
90	4.79301	152	4.82116	25	0.00109		
92	4.79395	154	4.82204	26	0.00113		
94	4.79488	156	4.82291	27	0.00117		
96	4.79582	158	4.82379	28	0.00122		
98	4.79675	160	4.82466	29	0.00126		
100	4.79768	162	4.82553	30	0.00130		

Take D equal to $\log. \beta - (\log. \beta' + B)$: then will the logarithm of the difference of altitudes in English feet be equal to $A + C + \log. D$.

“Example: In latitude 21° on the mountain of Guanaxato, in Mexico, Baron Von Humboldt observed as follows :

	Lower station.	Upper station.
Thermometer in open air	$t = 77.6^{\circ}$	$t' = 70.4^{\circ}$
Thermometer attached to barometer.....	$\tau = 77.6$	$\tau' = 70.4$
	In.	In.
Barometer.....	$\beta = 30.05$	$\beta' = 23.66$

What was the difference of level between the stations?

$$\begin{array}{rcl}
 \text{Log. } \beta' & = & 1.37401 \\
 B & = & 0.00031 \\
 \hline
 & & 1.37432 \\
 \text{Log. } \beta & & 1.47784 \\
 \hline
 D & = & 0.10352 \qquad \text{Log. } D = 9.01502 \\
 & & C = 0.00087 \\
 & & A = 4.81940 \\
 & & \hline
 & & \text{Log. } 6843.7 = 3.83529
 \end{array}$$

Consequently the difference required = 6843.7 English feet.”

This table mariners will find useful ; by it the height of islands, headlands, and mountains above the sea, may be determined. With a Kew barometer and a good aneroid, the height of all such places, when not far from the ship, may be measured within a few feet, provided the aneroid be carefully compared with the mercurial barometer *immediately* before setting out and after returning from the height to be measured; and provided, also, the observations on the height and on board be made, according to previous arrangement, at the same hour or within a few minutes of it. By this means the height of the Observatory above the Potomac has been determined within less than a foot.

M. F. MAURY.

OBSERVATORY, WASHINGTON, *March*, 1861.

EXPLANATION OF THE PLATE MARKED III.

The arrows *within* the circle fly with the wind. They represent its mean annual direction from each quarter, and by bands 5° of latitude in breadth, and according to actual observation at sea. They show by their length the annual duration of the wind in months. They are on a scale of one-twentieth of an inch per month, except the half-bearded arrows, which are on a scale twice as great, or one-tenth of an inch to the month. It will thus be perceived at a glance that the winds of the longest duration are the SE. trades, between the parallels of 5° and 10° south, where the long-feathered arrows represent an annual average of ten months.

The most prevalent winds in each band are represented by full-feathered arrows; the next by half-feathered, except between the parallels of 30° and 35° N., where the NE. and SW. winds, and between the parallels of 35° and 40° , where the NW. and SW. winds contend for the mastery as to average annual duration.

The rows of arrows on each side of the polar axis of the hemisphere, and nearest to it, are projected with the utmost care as to direction, and length or duration.

The feathered arrows in the shading around the circle represent the crossing at the calm belts, and the great equatorial and polar movements by upper and lower currents of air in its general system of atmospherical circulation.

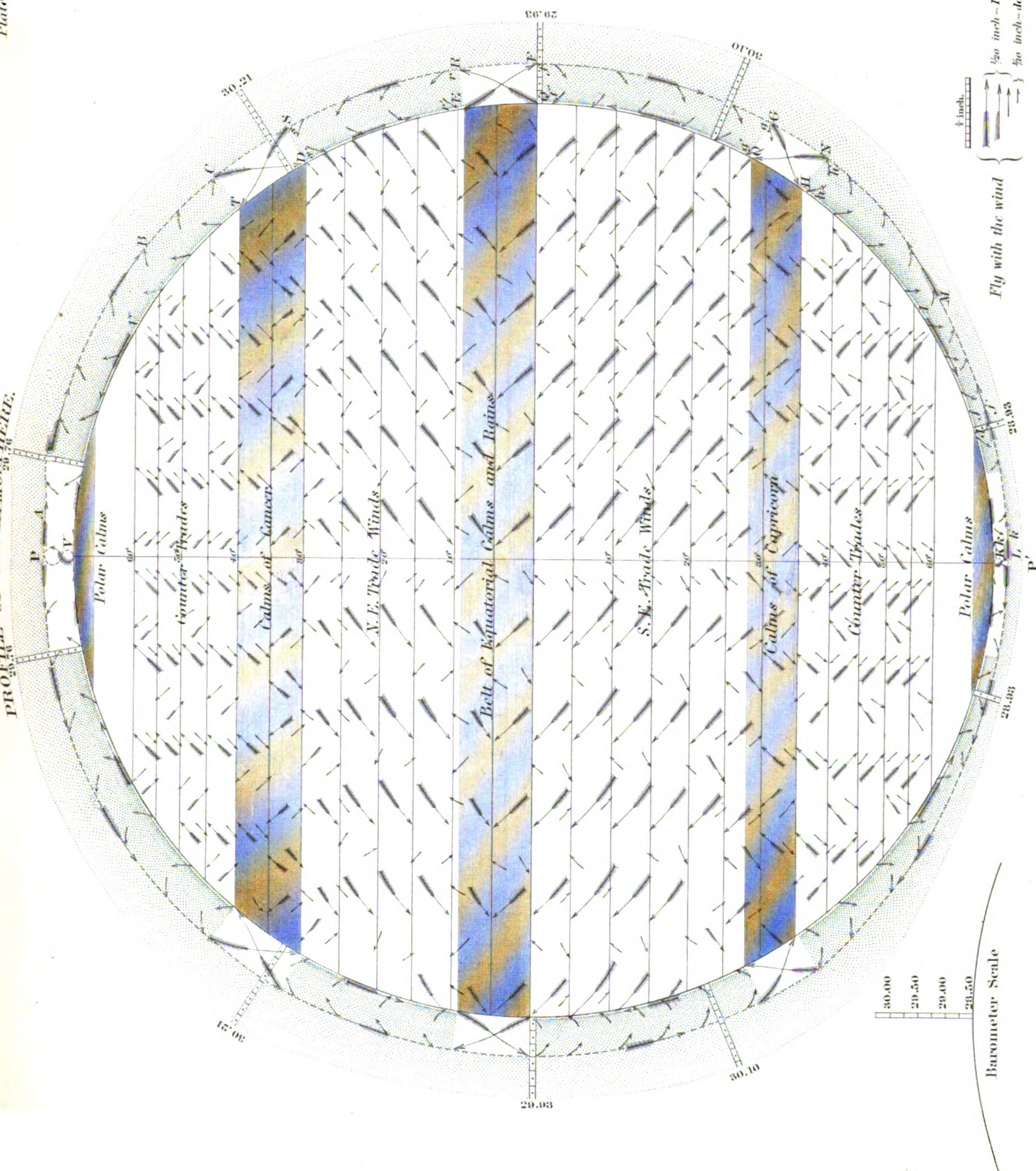
The small, featherless, and curved arrows, (*s's*, *r'r*, *f'f*, *g'g*, *h'h*), in the shading around the circle, are intended to suggest how the trade winds, as they cross parallels of larger and larger circumference on their way to the equator, act as an undertow, and draw supplies of pure air down from the counter current above, which supplies are required to satisfy the increasing demands of these winds; for, as they near the equator, they not only cross parallels of larger circumference, but, as actual observations show, they also greatly increase both their duration and velocity. In like manner, the counter trades, as they approach the poles, are going from latitudes where the parallels are larger to latitudes where the parallels are smaller. In other words, they diminish, as they approach the poles, the area of their vertical section, consequently there is a crowding out—a sloughing off from the lower current, and a joining and a turning back with the upper current. This phenomenon is represented by the small featherless and curved arrows in the periphery on the polar side of the calm belts of Cancer and Capricorn.

The dotted or shaded periphery is intended to represent a profile view of the atmosphere, as suggested by the readings of the barometer at sea. This method of delineating the atmosphere is resorted to in order to show the unequal distribution of the atmosphere, particularly on the polar side of the parallels of 40° north and south; also the piling up over the calm belts, and the depression (barometrical) over the equatorial calms and cloud ring.

This barometric profile of the atmosphere has been constructed from 100,000 separate observations on the barometer at sea, or near its shores. Of these, I am indebted to my indefatigable fellow-laborer Lieutenant Andrau, of the Dutch Navy, at the Meteorological Institute of Utrecht, for no less than 83,334, obtained by him from the abstract logs of the Dutch ships that are in coöperation with us. His labors there have been valuable in a high degree, and his King has acknowledged the importance of them, and the value of his services in this field of research, by bestowing upon him the distinguished order of the KNIGHTS OF THE CIVIL SERVICE.

The observations used for determining the mean direction and average annual duration of the wind, were obtained exclusively from the log-books of this office; so that here we have a picture of the winds at sea, as accurately as they can be represented by the means of 1,159,353 separate observations, each observation itself being the mean of many and extending through a period of eight hours.

M. F. M.



MAURY'S NAUTICAL MONOGRAPHS.

No. 3.

THE SOUTHEAST TRADE-WINDS OF THE ATLANTIC.

OBSERVATORY, WASHINGTON.

MAY, 1861.

NAUTICAL MONOGRAPH, No. 3.

THE SOUTHEAST TRADE-WINDS OF THE ATLANTIC.

This paper treats of the east and west crossings of the equator, the best route of eastern-bound vessels to their crossing place on the prime meridian, the best route also both from America and the Lizard to the line, and the relative strength of the two systems of trade-winds in the Atlantic.

Commencing with page 857, volume II, 8th edition of Maury's Sailing Directions, is a chapter on the "average force of the trade-winds." To compare the force of the NE. and SE. trades in the Atlantic, the average speed from crossing to crossing was deduced from the logs of 520 homeward-bound Indiamen. The following table shows the results:

Average daily run of 520 vessels along a mean track, extending from latitude 30° S., 10° E., via 33½° W., on the equator, to latitude 30° N., and 66½° W.

	FROM LATITUDE 30° S. AND LONGITUDE 10° E. THROUGH THE—																
	SOUTHEAST TRADE-WINDS TO THE EQUATOR IN 33½° W., VIA—								THENCE THROUGH NORTHEAST TRADES TO 64½° W., VIA—								
	25° S.	20° S.	15° S.	10° S.	5° S.	0°	Knots.	Course.	5° N.	10° N.	15° N.	20° N.	25° N.	30° N.	Knots.	Course.	
	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Per hour.		Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Per hour.		
January	159	146	139	139	144	118	6	N. 54° W.	135	167	192	179	147	112	6½	N. 49° W.	
February	145	108	133	147	160	120	5½	N. 55° W.	120	197	181	146	122	92	6	N. 46° W.	
March	146	158	146	119	149	110	6	N. 55° W.	163	203	192	170	126	114	6½	N. 47° W.	
April	136	133	131	160	134	102	5½	N. 53° W.	180	230	172	138	99	132	6½	N. 48° W.	
May	116	136	137	156	160	148	6	N. 55° W.	98	186	198	163	157	122	6½	N. 46° W.	
June	129	137	142	168	156	177	6½	N. 55° W.	119	128	215	193	126	105	6	N. 43° W.	
July	128	129	149	151	156	161	6	N. 55° W.	160	77	133	191	153	156	6	N. 46° W.	
August	154	118	140	146	126	167	6	N. 55° W.	146	85	116	148	113	86	4½	N. 46° W.	
September	121	135	150	168	164	164	6½	N. 55° W.	140	85	129	142	98	95	4½	N. 50° W.	
October	121	128	144	128	132	157	5½	N. 56° W.	113	89	166	161	145	112	5½	N. 45° W.	
November	155	155	157	151	133	157	6½	N. 55° W.	157	127	142	149	106	107	5½	N. 49° W.	
December	140	131	139	150	154	149	6	N. 55° W.	163	157	141	162	134	110	6	N. 48° W.	
Means	137	137	142	151	147	144	6	N. 55° W.	149	144	156	162	127	112	6	N. 47° W.	

By this table the average speed through each system of trades is the same, but through the SE. trades the winds are nearly aft; through the NE. just abaft the beam, which, with most vessels, is the most favorable point for speed.

Now, if we knew the force of wind that would give an average vessel six knots before the wind, and the force that would give her six knots with the wind abaft the beam, we should be able to form a pretty correct estimate as to the average difference in velocity between the NE. and SE. trade-winds of the Atlantic ocean.

Admiral Chabannes, while in command of the French fleet on the coast of Brazil, was kind enough to make a series of experiments upon this subject for me in his sailing frigate, the "Alceste," on her homeward passage in 1860. He reports the following:

Experiments made on board the frigate "Alceste," Commander Dubernad, bearing the flag of Rear Admiral Viscount de Chabannes, for determining the speed of the frigate with the wind at various angles, from close hauled to dead aft.

SPEED WITH WIND AFT.	SPEED WITH WIND, AND INCREASE OF VELOCITY COMPARED WITH WIND AFT.									
	At 14 points.		At 12 points.		At 10 points.		At 8 points.		Close-hauled.	
	Speed.	Increase.	Speed.	Increase.	Speed.	Increase.	Speed.	Increase.	Speed.	Increase.
<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>	<i>Knots.</i>
2.5	3.0	0.5								
3.4	3.9	0.5	4.7	1.3	5.3	1.9	5.7	2.3	5.3	1.9
4.6			6.0	1.4	6.7	2.1	8.0	3.4	6.7	2.1
5.0	6.2	1.2	7.9	2.9	8.2	3.2			7.2	2.2
6.0	6.5	0.5	7.8	1.8	9.5	3.5	8.4	2.4	7.4	1.4
6.0	6.4	0.4	8.8	2.8	8.5	2.5	9.1	3.1		
6.3	8.0	1.7	9.3	3.0	8.7	2.4				
6.9			8.0	1.1			8.3	1.4	7.5	0.6
8.5	8.6	0.1								
					5.6		6.6		4.8	
Mean for 6 knots.		0.5		2.3		3.		2.8		1.4

NOTE.—The different experiments, the results of which are inscribed in this table, were made during the passage from Bahia to France. They were made in the trade-winds, or in fixed and regular winds; nevertheless, even in the trades, the regularity of the wind was not always such that some results did not appear to differ a little from the rule. On the other hand, the log itself gives rise to errors sometimes quite large.

In going eight knots, we have thrown two logs simultaneously without touching the line; the two results differed a knot. The incomplete experiments were interrupted in consequence of the irregularity of the wind, and each result is the mean of two or three observations.

From this we infer that if these 520 vessels had sailed through the SE. trades at the same angle with the wind that they sailed through the NE. trades, their average speed would have been nearly nine (8.8) instead of six knots.

Comparing, then, according to these interesting experiments, the strength of the two winds, we have their relative force measured by the speed of the "Alceste," in knots per day as follows:

	NE. trades.	SE. trades.
Between the equator and the parallel of 5°	149 knots per day.	204 knots per day.
Between the parallels of 5° and 10°	144 " "	204 " "
Between the parallels of 10° and 15°	156 " "	209 " "
Between the parallels of 15° and 20°	162 " "	219 " "
Between the parallels of 20° and 25°	127 " "	215 " "
Between the parallels of 25° and 30°	112 " "	212 " "

The letter of the admiral, transmitting these results, contains much valuable information, with many practical suggestions. It shows, moreover, how much every commanding officer at sea may, without turning aside from the main object of the cruise, benefit navigation and advance the cause of human knowledge. I therefore quote the letter of this indefatigable fellow-laborer, as well for its example and hints as for the information it contains:

From Admiral O. de Chabannes to Captain Maury.

FRIGATE L'ACESTE, in longitude 33° west of Paris, [30° 40' of Gr.,] July 28, 1860.

DEAR SIR: Before leaving S. Salvador, on the 21st of this month, I received your kind letter of 14th May last, with the different publications accompanying, which could not be

more interesting. Accept for them my best thanks. I could not be more flattered than by what you are pleased to say concerning my efforts to extend, in a very small sphere, the magnificent works that you have given to the world, and permit me, my dear sir, to say that I am somewhat abashed by the estimate which you attach to my assistance in determining, by experiments, the force of the trade-winds; what I wrote to you on the subject was very natural. In the work that I have undertaken concerning the coasts of Brazil,* I have only followed, at a distance, your steps in the way of assisting navigation; besides, I am ardently attached to the study of the great laws of nature, which you have so admirably developed. You are the illustrious professor, and I am a mere disciple; yet a disciple very enthusiastic with regard to the works of his teacher, I assure you, and very zealous to profit by his lessons. Like you, I admire the wonders of nature, which confound our intellects in the infinitely small as well as the infinitely great.

I gave you in my last letter, of 10th May, the results that I obtained on the coast of Brazil. I should like to send you a manuscript of all the charts, but I am compelled to wait for the publication, for it is too long to copy by hand. I am occupied now with my return passage from the equator to Europe, and I am following the advice which you give in your *Sailing Directions*. The want of documents prevents me from enlarging as much as on my passage from Europe to the equator, and on my return to France I will make every effort to collect a large number of observations on this subject. The Hollanders have already entered upon this path, and the works of Mr. Van Gogh are very remarkable. I have only been able to collect, on board, some return passages of French war vessels. I send you the *time tables* that I have drawn up from their journals. I will add the passage of the *Alceste*. God grant that it may be short.

I set out to-day to cross the line at 33° west of Paris, although the winds would have permitted me to go much more to the east. This is $30^{\circ} 40'$ from Greenwich. And here I must make a remark. Would it not be very desirable, in all that concerns the sciences, if the same measures could be adopted in different countries? Could not the longitudes, temperatures, the heights of the barometers, &c., be compared without making the reductions often so inconvenient? You count longitude from Greenwich; we from Paris; the Spaniards from Cadiz, or the island of Ferro; the Portuguese from Lisbon; so that the charts and nautical accounts constantly require these corrections. But how can we arrive at the desideratum of having a common point of departure? National pride is so involved in this matter (certainly very mal-apropos) that it appears to me hardly possible to determine any point of 0° for all.

It is the same thing in the measures of heights of the barometer and thermometer. Our centigrade thermometer is incontestably preferable to Fahrenheit, and the decimal system of measures has certainly great advantages. Yet still we have here the habit that makes each one hold on to his own method of counting. In France we had great difficulty in adopting the new measures and new moneys. By the action of the government and by perseverance it was accomplished, and now they have become very popular. In order that the savants of all countries should determine upon a uniform measure, there would be necessity for almost a miracle that you alone can perform, or perhaps a Brussels conference. I cease from this digression and take up again the recital of my return passage.

* While in command on that station, this indefatigable officer sought and obtained access to all the log-books of the Brazilian navy for the last twenty-five years. With these and other materials within his reach he constructed, in the midst of the manifold duties of a commanding officer on that station, an admirable series of wind charts for that coast. They are now in the course of publication by Captain de La Varche, who has charge of the wind and current bureau in the Department de la Marine, Paris. No shipmaster in the Brazil or La Plata trade should be without these charts.

August 15.—I am determined to set out northwardly on the cessation of the monsoon from the SW. above the line. This monsoon has been very feeble; the calms and the very weak, variable breezes have, on the other hand, been very persistent, and from the fifth to the tenth degree of north latitude I have occupied 5.1 days. The trades from the NE. commenced in latitude 11° N., $32\frac{1}{2}^{\circ}$ longitude west from Paris, ($30^{\circ} 10'$ Greenwich.) As your *Pilot Charts* indicate, these winds, which at first were NE., have become successively more eastward, until even they became a little south. Yesterday (the 14th) I crossed latitude 30° N. in longitude 43° west of Paris, ($40^{\circ} 40'$ from Greenwich,) having had, since the evening of the 13th, light breezes. Now we are here in a dead calm, and I intend to make more to the north, in order, if I can, to get out of the *horse latitudes*, without endeavoring to go from the east. I have just communicated with the three-masted English vessel *The Abyssinian*, coming from India with 300 convalescent soldiers; I asked the captain to let me see his journal in order to compare our passages. He crossed the line on the same day and nearly at the same hour with the *Alceste*, but at $24\frac{1}{2}^{\circ}$ —that is to say, $8\frac{1}{2}^{\circ}$ east of us. He had been more favored than we, since he had made more way, and his sailing nearly equal to ours. I found, in fact, that he had not experienced so much of the calms between 5° and 10° , for his mean rate in this zone was 77 miles, while ours was only 59, and he had taken but four days in place of our five. It is true that from 10° to 15° he had taken 4.4 days, while we had taken 3.6, but he had gone 84 miles more than we. The comparison of our two passages is very interesting, in that it shows how the winds were at the same moment in almost the same parallel, and in different longitudes. It is by means of similar comparisons of vessels passing the line the same day of the same year, and having very nearly the same speed, that we can determine, in a positive manner, if there be any advantage for vessels coming from the Cape of Good Hope to deflect from their direct course in order to cross the line more to the west. It is probable that for certain months of the year the direct route would be the most advantageous, and the case of the *Abyssinian* proves it for the month of July. I will obtain the rest of the journal of this ship, which the captain will send me from London, and I will compare the remainder of our passage. My intention is to make for the 43° longitude west, about the 35° of latitude, where I hope to have winds from the west.

Then I will direct my course to the Devil's Rock, in order to enter the Bay of Biscay with the current from the Gulf Stream. I have made, as I promised you, my dear instructor, frequently repeated experiments, both south and north of the line, as to the speed of the *Alceste*, at various angles with the wind, from close-hauled even to winds aft. I send you the detailed results of them. Two things have happened in the course of these experiments which prevent them from having all the correctness desirable.—(*Vide* table, p. 2.)

1. The speed given by the log is not exact. I have cast two at the same time, and very rarely have they given the same number of knots and decimals; sometimes, even, the difference has been a whole knot. This proves that the log is a very imperfect instrument, (which, by-the-by, we already know,) and that if, in the estimate, averages are used for determining the distance, we can only arrive at an approximative result. Massey's log is decidedly the best, but this is really useful only for 24 hours.*

* There is great inconvenience in drawing up the log every time that the head is changed, which is indispensable for marking the routes; and besides, the wings of the *helix-shaped* float are easily bent. Sometimes they are bent by the teeth of sharks, if the entire log itself is not swallowed—a thing which has happened to me. For some time I have endeavored to make a simple instrument fixed to the hull of the ship, and more practical for measuring the speed of the vessels. I believe that I have at last arrived at what I desire.

2. The breezes which appear most regular have variations which change every instant the speed of the vessel. The successive logs for every five minutes prove this, and we find out the necessity of having on board an anemometer, in order to compare every moment the force of the wind with the speed of the vessel. I have read and reviewed your letter to Admiral Fitzroy on this subject, and I certainly give the superiority to your fleet of thousands of ships, as an anemometer, to the anemometer of the English admiralty that costs £65. But do you not think, my dear friend, that a very simple anemometer, and one of sure service on board, and at a very trifling cost, (say from £2 to £3,) so that each ship could have one; do you not think, I say, that such an instrument as would give the force of the wind at the same time with the speed of the vessel would be of great assistance in making your floating anemometer useful? Well, I hope that I have discovered it; and it is, with some modifications, the same instrument of which I hope to make a log. I have made one of them on board during this passage, and notwithstanding the imperfection of the execution, that required nice machinery that we did not have, I believe that I have accomplished something good. It will be necessary for me to make further trials, and some of these days I will tell you what I have accomplished.

August 31, 1860.—The *horse latitudes* have been very troublesome in increasing the time of our passage. From the 30th° to 40th° north latitude, which I reached in longitude 40° west of Paris, (37° 40' Greenwich,) the calms and variable winds have only permitted us to make 200 leagues and upwards in 12 days, with a mean rate of 53 miles per day, and while the *Alceste* is a good sailer. On the 27th the winds commenced blowing. They freshened up to the northwest and north, and to-day we are in north latitude 46°, longitude 20°, west of Paris, (17° 40' from Greenwich,) with a mean rate of nearly 10 knots, sometimes going at the rate of 12 knots. The sea is so heavy that I have not been able to try my log or speed-gauge and my anemometer. With the latter I have, however, made 600 revolutions a minute, with a very fresh breeze, and I can consequently establish a scale of the number of revolutions according to the different forces of the wind. The *stop* acts at the same time on the anemometer and the log, so that we can make a perfect account of the diminution and increase of the wind, and it will only be necessary to make a table of correction for the direction of the wind. On my arrival in France I will undertake this work.

I wish now to tell you, my dear colleague, of another kind of research that I have made according to the interesting table that you have made in the *new field of research* in your first volume of "*Sailing Directions*." I have been led to it by observing at night the phosphorescent mollusks, the largest and the most brilliant that I have ever seen. They were visible for more than a hundred metres, but only became luminous from being disturbed by the keel. We were in latitude about 5° north, and were going at the rate of four or five knots. I made a net, in which I took some of them. They are cylindrical, long, hollow, white, and opaque; the longest being from four to five inches. These are ———, of the species of *red pyrosome*. I have preserved some of them in alcohol. Since, I have taken great care to collect all the animalculæ that I could. I am particularly occupied with those that are luminous, and I have collected different kinds of them, according to the latitude. Some of them are microscopic; but I have only a poor instrument for observing them, and I have not attempted to sketch any of them, as was so admirably done by Mrs. Toynbee, on the *Glorianna*. I am, besides, perfectly ignorant of the structure of the inhabitants of the sea, and I could give nothing satisfactory to Professor Dana. I can, if you wish it, send you some specimens preserved in alcohol. I ought

to add that they are chiefly *gelatinous* and *acephalous mollusks*. I have them in a bottle, subject to your disposition.

The phosphorescence of the sea is a very curious phenomenon. It is acknowledged that it is due to animalculæ; but what is it that makes these animalculæ luminous? It is evident to me that electricity or magnetism is the principal cause; electricity, the mysterious agent that is spread out everywhere in creation, and which plays so important a part in all of the phenomena of nature. Its effects are made apparent to us in the storms and auroras, &c.; but the spectacle of luminous seas is not less striking; and it would be very interesting to compare the state of an electrometer with the phosphorescence of the sea, with the latitude, the position of the sun, and the variation of the needle. It is very probable that there exists an intimate connexion between them. It is all a study for the future. For myself, when I see electricity spread out in such great quantity over the sea, I ask if we cannot utilize this electricity on board ships, as a motive power in place of steam, or, at least, for the purposes of light. It is only required to accumulate it at one point. We ought to be able to accomplish this.

In respect to the variations of the needle, (which, independently of different degrees for different parts of the globe, has a secular variation sensible in degrees for every place in a period of years,) it would be a matter of great interest to determine, every five years, for example, the variations obtained on all seas by the ships that navigate them, and to compare the differences. I have attempted to collect in one table all the variations that your *wind and current* charts give—those contained in the *abstract logs* of your eighth edition of *Sailing Directions*, and also all those given by the English charts, by our charts, and by all the sea journals that I could lay my hands on. The result is a collection of the variations of the compass, in squares of 5° a side; but the whole gives nothing satisfactory. These variations have been taken from very different years, sometimes with intervals of 40 or 50 years or more, and consequently present great differences, so that I cannot classify them. I have received from Paris observations which go back nearly three centuries, and which give the following results:

In 1580 the variation was	11° 30' E.
In 1663.....do.....	0°
In 1700.....do.....	8° 10' W.
In 1780.....do.....	19° 55' W.
In 1785.....do.....	22° 0' W.
In 1814.....do.....	22° 34' W.
In 1825.....do.....	22° 22' W.
In 1830.....do.....	22° 12' W.
In 1835.....do.....	22° 4' W.
In 1850.....do.....	20° 30' W.
In 1853.....do.....	20° 17' W.
In 1855.....do.....	19° 58' W.

The declination, which was nothing at Paris in 1663, increased towards the west until 1814, that is, in the space of 151 years, an epoch in which it attained 22° 4'; and since then it has been diminishing. Is this rate the same for all points of the globe? It is this which it is necessary to examine thoroughly. Numerous examples seem to prove the contrary. Do you not think, my dear instructor, that it would be very interesting to collect every year the variations obtained from vessels navigating all seas, and to form from them charts in small

squares of 5° latitude by 5° longitude, in which should be written the means obtained in each square? We could then trace *isomagnetic* curves and a magnetic equator, which it would be curious to compare with that obtained by the philosophers who have occupied themselves with this question. In order to do this, it will be necessary to communicate with all sailors who might agree thus to obtain promptly a result which, at the same time that it would clear up this question, would serve navigators; for there are not always the means of observing the variations of the compass on board, and besides, in iron vessels and steamships, we often obtain very erroneous results. This is what I propose to do: to ask each captain to note with care the variations every day during his voyage, and to make of them a small table like this:

Date.	Latitude.	Longitude.	Variation.	State of the atmosphere.				Phosphorescence of the sea.	Observations. Perturbations of the land compass by auroras, hurricanes, storms, &c.
				Winds.	Barometer.	T. air.	T. water.		

These tables, united on the return of the vessel, would give the elements of charts that I propose to construct. I will devote myself to this subject on my arrival in France, and will cause that all the French captains of merchantmen, as well as the imperial marine, may receive instructions to this effect. I will also communicate with the admiralty and Board of Trade in London, in order to introduce the same thing on board of English vessels. If you approve of my idea, my dear instructor, will you not ask this addition to the abstract logs of your captains? In this case you might be interested to make the research in order to add the information to your *Sailing Directions*, which are so expansive. This would be the means of making them more useful, and if so, I will send you all the elements that I may have to assist in making the charts. If, on the other hand, you prefer that I finish the work, I will ask you to send me the tables which you may have, and I will place the results at your disposal. The Hollanders might perhaps aid us in this work; and as, I suppose, you have intimate relations with the Institute of Utrecht, you might perhaps suggest this idea to them.

I would never finish, my dear Maury, (allow me this very friendly expression,) if I undertook to write to you concerning all the subjects that attach themselves to your great work, as the currents, heights of barometers in the southern and northern hemisphere, which explain the difference of the force of the trade-winds from north and south, &c., &c. For this time I believe that this letter is sufficiently long, and I close, only intending to add a few lines to announce to you my arrival in the roadstead of the Isle of Aix.

We are, 1st of September, in latitude 46° north, and longitude 15° west of Paris. We have made 660 miles in three days, and although the winds from NW. seem to fail us, I hope to arrive in three or four days more.

ROADSTEAD OF THE ISLE OF AIX, *September 6, 1860.*

Thanks to the gallant admiral to have thus made one decided and important step towards an absolute determination of the relative force of the NE. and SE. trade-winds at sea. It appears that while, on the average, the NE. trades of the Atlantic have force enough to give to vessels

a speed of six knots, wind abaft the beam, the SE. has force enough at the same angle to give them a speed of eight or nine knots. Consequently, if the great currents in the sea be due, as Sir John Herschel in the *Encyclopedia Br.* maintains they are, to the trade-winds, those of the southern should be much stronger and more constant than those of the northern inter-tropical regions. But are they? The experience of every navigator enables him instantly to reply that the currents of the NE. trade-wind regions of the Atlantic keep in place a much larger volume of water than do those of the SE. trade-wind regions. Neither are the currents of the latter where the trades are stronger and more regular as constant as those of the former where the winds are lighter and more variable. Indeed, we have here another of the many proofs which these researches are continually developing, viz: that the winds have very little influence in creating the constant currents of the sea. The currents that the winds make are variable, like the winds; but the great currents of the sea are as constant in their flow as the great Amazon itself.

The Track Charts show that between the Equator and 20° S, in the Atlantic, the SE. trades hold more to the south in mid-ocean than they do on the American side. Thus the vessels which cross the line west of 25° usually find by the time they reach 20° S. that they have made 3° more of easting than those do which cross to the east of that meridian; at least, such is the case on the average. The following tables of crossings will not only show this more in detail, but they will also show whether it is better for Indiamen and other vessels bound for ports beyond the Cape of Good Hope to cross the Equator to the east or the west of the 25th meridian of west longitude.

Crossings in the South Atlantic from the Line to the Prime Meridian.

WEST OF 25 DEGREES.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—															Latitude of crossing meridian of Green- wich.	Total days.
Class.	Name.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.			
Ship	Paul Jones	Jan. 2, 1843	33½	1½	33½	2	35	1½	34½	1½	34	3	32	3½	24	8	36	91	
	Malay	Jan. 3, 1855	31	1½	31	1½	31	1½	30½	1½	30½	2	29	1½	28	8½	43½	18½	
	Petrel	Jan. 3, 1855	30	2	30½	2	30½	1½	29	1½	27½	2	25½	2½	22	8	36	19½	
Bark	Storm	Jan. 4, 1854	30½	2	33½	2	35	1½	33½	2½	29	2½	24½	4½	21½	8	41½	23	
	Grafton	Jan. 5, 1852	28	2½	30½	1½	31½	2	31	2	31	4	27½	5	20½	7½	36	24½	
	Fenelon	Jan. 5, 1854	28	2½	32	2½	33	2½	32½	2	31½	3	32½	2	30	20	37½	34½	
Ship	Colorado	Jan. 5, 1857	28	2	31	2	32½	2	32½	2	31	3	30½	8	27	8½	88½	27½	
Bark	Quickstep	Jan. 7, 1856	32	2	33½	2	34	1½	33	1½	32½	3½	31½	5	29	8½	42	24½	
Ship	Leopold	Jan. 7, 1858	27	2	30½	2	31½	2	31½	1½	32	2½	32½	5	29½	9½	38½	24½	
Bark	Benefactor	Jan. 7, 1858	29	1½	32	1½	34	2	32½	2	30½	3	24	3½	14½	6½	37½	20	
Ship	M. Howes	Jan. 8, 1857	34	2	35½	3	34½	1½	34½	2	36	2½	34½	4½	29½	9	39	24½	
	North Light	Jan. 8, 1857	34	2½	35	2½	33½	1½	33½	2	33	3	32½	4	30	8½	46	24	
	Samuel Appleton	Jan. 9, 1857	32½	2	32	2	33	1½	33	1½	33	3	32½	4½	28½	8½	41½	23	
	Santiago	Jan. 11, 1858	30½	3	32½	2	32½	1½	32½	1½	31	2	28½	2	24½	8½	39	20½	
Brig.	Lucilla	Jan. 12, 1845	28½	2½	32	2½	33	2	38	1½	31	2½	29½	4½	20½	7	36½	22½	
Ship	Ocean Steed	Jan. 12, 1854	27	2½	30	1½	32½	2½	34	3½	32½	3	30½	3	30½	14½	41½	30	
Bark	Josco	Jan. 12, 1854	27	2½	30	1½	32½	2½	32	3	29½	3	26½	5	22½	12½	36	30	
	Avondale	Jan. 13, 1854	26½	2½	29	2½	32	2	31	3	29½	3	29½	3	29½	15½	50	31½	
	Lepanto	Jan. 13, 1855	32½	2	33	2	32	1½	32	2	31½	5½	22½	3	23	10½	38	26½	
	Saxonville	Jan. 14, 1855	30½	2	30½	2	30	2	27	2	25	2	24	8	10	3	32½	21	
Ship	Scargo	Jan. 16, 1853	29½	5	30½	2	31½	2	30½	2½	29	3½	26½	6	21½	7	36	28	
	Pontiac	Jan. 16, 1852	29½	4	31½	2	33½	3	33	2	3½	2	29½	3	24½	10	40	26	
Brig.	Lucilla	Jan. 18, 1843	27½	2½	29½	2	31½	1½	31	2½	28	2	25	4	20	14	35½	28½	
Ship	Anna Kimball	Jan. 18, 1857	30	4½	31	2	32½	3	32½	2½	32	3½	29	5	28	10½	38½	31	
	Indiaman	Jan. 19, 1855	31	2½	32	1½	34½	2	34½	3½	34	½	34½	3	32½	8	43	21	
Bark	Fairy	Jan. 19, 1858	25½	2	29	1½	30½	1½	30	1½	29½	1½	27½	3	26½	7	36½	18	
Brig.	Brothers	Jan. 23, 1852	27½	3	31½	2	31½	2	31½	2	31½	3	30½	3	23½	15	35	30	
Ship	Cynthia	Jan. 23, 1856	30½	2½	32	2½	33½	2	33	1½	32½	4½	30	6	27	9	40½	28	
	Tornado	Jan. 24, 1858	29½	1½	32	1	32½	1½	32½	1½	32½	2	31	5	31	11½	42½	24½	
	Walpole	Jan. 27, 1851	25½	5	30	2½	31½	1½	32½	2½	32½	3½	27½	3	23½	13½	36½	31½	
	Niobe	Jan. 29, 1855	30	3	33	1½	34	2	34½	1½	32	1½	31½	2	30	12½	39	24½	
	Windward	Jan. 29, 1855	30	2½	33½	2½	34½	2	34½	1½	33½	1½	31½	1½	31	11½	39	23	
Brig.	Envoy	Jan. 30, 1852	25½	2½	28	2	29½	2	28½	2½	27½	2	25½	2	23½	10	37½	23	
Bark	Australia	Jan. 31, 1858	28	4	30½	2	34	2	35	3	34	3	25½	2	18½	11	36½	27	
Thirty-four passages—averages.....			29½	2½	31½	2	32½	2	32½	2	31½	2½	29	3½	25	10	39	25	

EAST OF 25 DEGREES, (INCLUSIVE.)

Ship	Stephen Lurman	Jan. 1, 1848	23	2½	26	1½	28	1½	29½	1½	28	2½	27	5½	20	7	37	22
Bark	Lewis	Jan. 1, 1854	24	2½	28	1½	29½	1½	30	2	29	2½	23½	2½	19½	10	34½	23
	Constance	Jan. 2, 1848	22½	3	28	2	30	1½	30½	2½	30½	5	27½	6	17	9	34½	29
Ship	Rome	Jan. 11, 1846	25	2½	30½	2½	33	2½	33½	3	29½	3	26½	8½	9	6	33½	28
	Grafton	Jan. 19, 1842	24	2½	27½	2	28½	1½	29½	2	30	3½	27½	3½	22½	7½	38	22½
	General Harrison	Jan. 20, 1848	25	3	29	2	31	2	32	2½	33½	5½	28	4½	22½	10½	36	30
	Witch of the Wave	Jan. 20, 1858	25	2½	28	1½	28½	2	29	2	27	2	27½	8	16½	6	38½	24
Bark	Stormway	Jan. 24, 1854	22½	2½	27	2	26½	1½	27	3	26½	3½	21	6½	9½	3½	33	23½
Brig.	Retriever	Jan. 26, 1854	20½	4½	29½	3	25½	3	25½	3	25	6½	28	6½	25½	14	36½	40½
Ship	Boston	Jan. 27, 1851	24½	4	29½	2	32½	1½	32½	1½	32½	2½	32½	2	28	11	38½	24½
	Piquet	Jan. 29, 1855	25	2½	30	2	32	1	33½	2	33½	1	31½	1½	28	18½	33½	28½
	Mary	Jan. 31, 1852	19	3	23½	2	31½	3	28½	2	29½	3	31½	4	26½	10½	39	27½
	Talbot	Jan. 31, 1848	25	2½	30	2	32	1½	32	2½	33	1½	33½	3½	31	11½	37	24½
Thirteen passages—averages.....			24½	3	28½	2	29½	2	29½	2½	29½	3½	28½	4½	21½	9½	36	26½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Bark	Imaum	Feb. 1, 1853	29½	4	31½	2	33	3	31½	3	28½	4	21	3	13½	10½	37½	29½
Ship	Hornet	Feb. 1, 1857	26½	2	28	2	29½	1	29½	1½	30½	4	27½	7	31	6	37	23½
	Josiah Quincy	Feb. 2, 1854	29	4	30½	2	30½	2	32	2½	31½	4½	31½	4	26	10½	36	29½
Bark	Storm	Feb. 2, 1855	26	2½	29	1½	31	2	32	2	33	1	34	2	34½	11½	35	22½
Ship	Dashaway	Feb. 3, 1855	27½	2	31	2	34	1½	36	1½	37	1½	38½	1½	37	11½	38	21½
	Lucknow	Feb. 8, 1855	31	2	32½	2	33½	1½	34	2	34	1½	33	2½	29	13½	37½	25
	Yzar	Feb. 11, 1853	27½	3	31	2	30½	1½	30½	3½	32½	3½	29½	4½	23½	10½	39	28
Bark	Falcon	Feb. 13, 1852	27	2½	29	1½	31	2	31½	1½	31½	2½	29	3½	29½	9½	36½	23
Ship	Mattapan	Feb. 16, 1857	26½	2	31	2	33	2	33	3	32	4	30½	2	30½	16	43	32
	Australia	Feb. 17, 1856	30	2	31½	2½	32	1½	33	2	33½	4	32	2	30½	12½	44½	26½
	S. H. Talbot	Feb. 18, 1858	29½	2	33	2	32½	2½	32½	1½	32½	2	34½	2	34½	15	41	27
	Carrington	Feb. 20, 1848	25½	3½	30	2½	35	2½	37	2	36	2½	36½	3	31	12½	39	28½
	Clasca	Feb. 20, 1858	29½	2	32	2	32½	2	33½	1	34	3	34	3	30	12	38	25
	Euterpe	Feb. 23, 1855	31½	2½	33½	1½	33	1½	33½	1½	35½	6½	42	2½	44	13½	38½	28½
	David Brown	Feb. 24, 1855	28	1	30½	1	30	1½	30	1	30	1½	30	2	27½	6	38	14
	Chicora	Feb. 26, 1848	27½	3	33	3	34½	1½	34	2	35½	2½	35	2	26	9	34½	23
Bark	Gertrude	Feb. 26, 1855	29½	2	31	2	31½	1½	31½	2	32	3½	25½	4	24½	7	36	21½
Ship	Medford	Feb. 27, 1854	28½	4	31	2½	32½	2½	32	2	31½	4½	26½	6	18½	8½	37½	30½
	Hindustan	Feb. 27, 1857	28	2	31	3	32½	2	32	1	32½	3	32½	1½	33	11½	28	24
	Witchcraft	Feb. 28, 1857	39	8	36½	8½	35	1½	35½	3	35	4	33	1½	33½	7	40	33½
Twenty passages—averages			28½	2½	31½	2½	32½	1½	32½	2	33	3	31½	3	29½	10½	37½	25½

EAST OF 25 DEGREES, (INCLUSIVE.)

Ship	Restitution	Feb. 2, 1820	25	5	25½	2	27	2	28	1½	28	2	26½	4	22½	7	39½	23½
	Valparaiso	Feb. 3, 1855	23½	2½	27½	1½	28½	2	29	1½	29½	1½	30½	2	29½	10	39	21
	Rajah	Feb. 6, 1826	14½	5½	18	2½	22	2	22½	2½	22½	1½	23	2	21½	8	37	23½
	Panther	Feb. 10, 1831	20½	3	23½	2	25	2	25½	3	28½	2½	28	2½	24½	10	37	24½
	Huntress	Feb. 17, 1842	21½	4	26	1½	27½	2½	28½	2	28½	5	26½	3	26	10	36½	28
	Mary	Feb. 23, 1821	23½	3	28	2½	30	2	32	3	30	3	27	4	22	9	37½	26½
	Cyrus	Feb. 29, 1820	21½	2½	21½	1½	25½	2	25½	3	24½	4	21½	4½	20	10	38	27½
Bark	Lepanto	Feb. 29, 1856	24	3	29½	2	31	2	30½	1	30½	3	28½	2	26	12	38	25
Eight passages—averages			21½	3½	25½	2	27	2	28	2	27½	2½	26½	3	24	9½	37½	25

WEST OF 25 DEGREES.

Ship	Romance of the Sea ..	Mar. 1, 1855	29	1½	31	2	31½	2½	33½	2	31½	1½	30	1½	27	6	39½	16½
	Win. Frothingham ..	Mar. 2, 1854	26½	3	25½	1½	27½	2½	28½	3	28½	4	24½	7½	10	3½	35	24½
Bark	Havana	Mar. 4, 1854	31	3½	33½	2½	33½	2½	33½	2½	31½	5	28½	2	28	12	41½	30
Schooner	Surf	Mar. 4, 1854	29½	3	32	2	32	3	31½	2	30½	5	26	2	26½	9	43½	26
Ship	Samuel Russell	Mar. 4, 1858	30	1	31½	2	34	2	32	2	29	2	26½	4½	21½	8½	40	22
	Windward	Mar. 6, 1856	30	2½	33½	2½	31½	2	34½	1½	33½	1½	31½	1½	31	11½	39	23
	Ariel	Mar. 7, 1853	30	3	30½	2	32½	1½	34	2	35	2	34	6½	29½	12½	37½	29½
	Gravina	Mar. 7, 1855	28½	3	32½	3	32½	1½	33	1½	33½	2	30½	4	25½	7	35½	22
	Samuel Appleton	Mar. 7, 1858	30½	2	30½	2	32	2	32	2	32	2	30½	2	28½	9½	43	21½
Bark	Candace	Mar. 8, 1853	30	2	30½	2½	33	1½	34½	2	35½	5	34	4	32½	13½	37	30½
Ship	Jalawar	Mar. 8, 1856	27½	3	29½	2	31	2½	28	2½	26½	2	23½	2½	20½	8	36½	22½
	Helena	Mar. 9, 1848	28	3	32	3	34	2½	34	2½	33	1½	31	2½	24	8	37	23
	B. F. Hoxie	Mar. 9, 1858	28½	2	31	1	33	2	33	2	33	2	31	1½	30½	9	43	19½
	Houqua	Mar. 10, 1852	29½	2	31½	1½	32½	1½	33	2	33	6	24½	4	19½	7½	33	24½
Bark	Daniel Webster	Mar. 12, 1853	28	6	29	3	32½	3	33	3½	26½	5½	22	3	17	4½	31	28½
Ship	Art Union	Mar. 13, 1857	25½	3	28½	2	30½	2	31½	3	29½	4	27½	1½	26½	11	37	26½
Bark	Guide	Mar. 13, 1857	29	3	32	1½	34	3	35	2	33	3	32	2	29½	10½	37½	25½
	Hull	Mar. 16, 1844	27½	2½	31	2½	33	2½	31½	4	33	2½	34	1	32½	10	37	25

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Bark.....	Parmelia.....	Mar. 16, 1853	27½	4	28½	2	30½	3	29½	4	25	5	22½	4	13½	6½	30½	28½
Ship.....	Ganges.....	Mar. 19, 1856	25½	3	28	2½	29	1½	29½	1½	29½	2½	28½	3	22½	11½	40½	25½
Bark.....	Sappho.....	Mar. 20, 1844	26½	4½	27½	2	30½	2½	33½	2½	33½	2	32	2½	26½	7	36	23
Ship.....	Geneva.....	Mar. 21, 1857	26½	3	29½	2	30	2	3½	2½	31½	2½	29½	2	25½	11	34½	25
	Whirlwind.....	Mar. 24, 1856	28½	1½	30½	2	33½	1	34½	2	34	3	29½	4½	30	8	46½	22
	Beverly.....	Mar. 25, 1856	28½	1½	30	2	31½	1½	32	1½	31	2½	28	3	29	9	47	21
	Ariel.....	Mar. 26, 1856	26½	3½	28½	2½	31	1½	31½	2½	30	3½	27½	7	20	8½	36	29
	Architect.....	Mar. 26, 1854	29	2½	29	1½	29½	2½	30½	3	29½	2	31	3	29½	7	40½	21½
	Mandarin.....	Mar. 26, 1857	28½	2½	32½	2	34½	2	34½	2	32	1½	31	1½	26½	10½	40	22
	Albert Franklin.....	Mar. 27, 1854	26	3	27½	3	30½	3	33	3	33	2½	31½	4½	21½	11	38½	29½
Bark.....	Wampanoag.....	Mar. 27, 1857	29	3	31½	2½	33½	1½	34½	2	33	2	30½	2	28½	12	40	25
	Thetis.....	Mar. 28, 1857	28½	2½	32½	2	33½	2	33	2	32	2	31	2	29	17½	36½	30
Ship.....	Ann Maria.....	Mar. 28, 1857	27½	3	31½	3	31½	2	31½	2	30½	2	30	4	29	19	38	35
Thirty-one passages—averages.....			28½	2½	30½	2½	32	2	32½	2½	31½	3	29	3	25½	9½	38½	25

EAST OF 25 DEGREES.

Ship.....	Grotius.....	Mar. 13, 1839	20½	5	24½	3	29	1½	30	2½	31½	4½	31½	6	25	11½	37	34½
	Ksaide.....	Mar. 17, 1848	20½	3	24	2	27	2	28½	3	29½	2	27½	2	23	8	34½	22
	Cohota.....	Mar. 24, 1849	25	6	28	3	31	2	33½	2	34	2	34½	8	17½	5½	37½	28½
Brig.....	Hector.....	Mar. 29, 1806	20½	4	22½	2	23½	2	24½	3	25	4	21	4	12½	10½	38½	29½
Ship.....	Akbar.....	Mar. 29, 1845	21	5	23½	2	25½	1½	25½	2½	25	3	27½	3	26	14½	37½	31½
Bark.....	Emu.....	Mar. 30, 1849	21½	4	24	3	27	2	30	2	31½	3	30½	2½	30	11	36½	27½
Ship.....	Hypogriffe.....	Mar. 30, 1854	24½	6½	29	2½	30	1½	32	1½	32½	2	33½	5	26½	9½	39	28½
Seven passages—averages.....			22	4½	25	2½	27½	2	29½	2½	29½	3	29½	4½	23	10	37	29

WEST OF 25 DEGREES.

Ship.....	Kildare.....	April 2, 1856	25½	3	28	2	28½	2	30½	2½	32	3½	32½	3	29½	9½	37½	25½
	Jacob Bell.....	April 3, 1856	29½	2½	32½	2	32½	2	33	2	33	3	31½	3½	27	8½	42½	23½
Bark.....	E. Corning.....	April 4, 1853	28	2½	31	2	31½	1½	31½	2	29½	3	23½	4½	19½	7½	35½	23
	Anna Bucknam.....	April 5, 1850	27	3	29½	2	30½	2	31½	2	32	5	26½	2½	23	8½	34½	25
Ship.....	Samuel Russell.....	April 8, 1851	26	2½	29	1½	31	1½	32	2	32½	4	32½	2	28½	7	37½	21
	Ariel.....	April 8, 1851	26½	3½	29	1½	31½	2	33½	2	34½	3	33½	3	26½	9½	36½	24½
Bark.....	Storm Bird.....	April 11, 1855	28½	3	30	2	34	3	35	3	35½	1½	36½	2½	31½	11½	42½	26½
Ship.....	Phantom.....	April 12, 1857	26	2½	26	2	28	1	28½	4	27	1	27½	2½	20	7	35½	21
Brig.....	Nabob.....	April 13, 1833	28	3	32	1½	33	2½	34	2½	35½	2½	35	2½	33	14½	37	28½
Ship.....	Northern Light.....	April 13, 1856	29	2	31	1	33	1½	34½	1½	35½	1½	35	1½	33	8	39½	17
	Golden State.....	April 13, 1857	26	3	26½	1	27½	1	29	2	29	3½	28½	1½	27	9	37½	21
Bark.....	Biruzi.....	April 14, 1850	26½	4	31	2½	32½	2	30	6½	27	2	28	4	21½	9½	32½	30½
	Krusington.....	April 15, 1846	27	4	30	1	31½	2	34½	2	33½	3	30½	10½	17	5	37	27½
Ship.....	R. M. Mills.....	April 17, 1857	26½	5	30½	2	31½	1½	32½	2½	32½	4	31½	2	29	9	39½	26
	Isaac Jeanes.....	April 18, 1858	28½	3½	32½	2	34	2½	34	2	32	4	50½	3	27	9½	39	26½
Bark.....	Oregon.....	April 20, 1853	27½	3	28½	1½	30	1½	32	1½	32½	3	30½	4	23	12½	36½	27½
Ship.....	Boston.....	April 21, 1852	25½	7	26	2	25½	2½	27	2½	29	3½	27½	3½	26	8½	31	29½
Bark.....	Candace.....	April 22, 1851	30½	2½	32	1½	32½	1½	32½	1½	31½	9	13½	5	17½	3½	35	25½
	Lucy Maria.....	April 22, 1854	27½	2½	28	1½	29½	2	31½	2	28½	3	27½	2	23	7	34½	20
Ship.....	Tartar.....	April 24, 1845	31	2	32	1½	31½	1½	30	1½	30	2½	30	2½	29	-9½	37	21½
	Tartar.....	April 26, 1849	25½	2	26½	1½	27	1½	28½	1½	28½	2½	27	2	19½	6½	34½	17½
	Delhi.....	April 27, 1848	25½	3	28½	2½	31	2½	33	2	34½	4	32	7	24½	9½	35½	30½
	Horsburg.....	April 28, 1848	29½	2½	33	4½	34½	2	35½	2	36	5½	34	3½	25½	6½	35½	26½
	Scargo.....	April 29, 1854	28	2½	31	2½	33	2½	35	3½	34½	3	34	3	28	11	36½	28
	Florence.....	April 29, 1856	31½	1½	34½	6	34	1½	33½	3	32	3	29½	2	26½	8½	39	25½
	Hotspur.....	April 29, 1857	28½	3½	29	1½	31	1	31½	2	31½	2	31½	2	29½	7½	41½	19½
Twenty-six passages—averages.....			27½	3	30	2	31½	1½	32	2½	32	3½	30	3½	22	8½	37	24½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

EAST OF 25 DEGREES.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Ship	Hamilton	April 1, 1839	22	5	25	2½	28	3	29½	2	29	3	27	3½	23	9	37½	28
	Oneida	April 3, 1839	17½	4	23½	2½	24	1½	24½	2½	24	2½	19½	3	11½	6½	36½	22½
	Lotus	April 10, 1839	19½	3	22	2	24½	2	26½	2	26½	2	23½	3	19	7	35½	21
	Grotius	April 10, 1840	22½	6½	26	2½	29½	2½	31½	2½	30½	4	23½	7	32½	10	36½	35
	Caroline Augusta	April 12, 1848	21½	3	26½	2	27½	2	28	1½	28½	2½	23½	3	21½	7	35½	21
	Brewer	April 14, 1854	23	2½	24½	2	26½	2	26½	2	26½	4	26	6½	18½	9	36½	28
Bark	Trenton	April 16, 1838	22½	2	24	2	26½	1½	27	2½	29	5	33	1½	31	10½	39	25½
	Anonimo	April 17, 1844	16½	3	19½	2½	21	2	20	4	21	2½	20	8	8	5	33½	27
Ship	Grand Turk	April 20, 1792	20½	3	25½	7	33	2	34	9	30½	5	26	9	14	7	35½	42
	Panther	April 21, 1832	22	2	24	2	26	1½	27	1½	28½	3½	23	3	20½	7	37½	21
Bark	Probus	April 22, 1842	22	4½	23	1½	25	1½	26	1½	26½	2	25½	7	14½	4½	34½	22½
	Lenox	April 22, 1845	23	3	27	2½	30½	2½	31	2	31½	2	31	2	30½	13½	37	27½
Ship	Queen of the East	April 23, 1855	23½	2	26	2	29	1	30	2	30½	1½	28	2½	24	7½	36½	18½
	Vandalia	April 24, 1853	24½	3	27½	2½	28½	2½	29	4	25	4	16½	5	15	8½	37½	29½
Bark	Houqua	April 26, 1849	21½	4	24	3	27	2	30	2	31½	3	30½	2½	30	11	35½	27½
	Derby	April 27, 1828	18½	2	22	2	25	2	27½	4	27½	4	31½	3	27	12	36	29
Bark	Hull	April 27, 1845	25	2	27	2½	30	2	30	2	29	2	28	2	28½	9½	36½	22
Seventeen passages—averages			21½	3½	24½	2½	27½	2	28½	2½	28	3	26½	4½	21½	8½	35½	26½

WEST OF 25 DEGREES.

Bark	Yarmouth	May 3, 1853	32	4	34	6	34½	5½	36½	2½	34½	4	26½	6	20½	10	36½	38
Ship	James Baines	May 3, 1856	30½	1½	34½	2	32	2	33	2½	32	3½	29	1	28	8½	38	21
	Santiago	May 3, 1856	31	2	32	2½	33½	3	30	3½	28½	3	23½	9½	14½	7½	40	31
Ship	Gloriana	May 5, 1855	28½	3	33½	4½	34½	2½	36½	4	35	4	29½	4	26½	13½	40½	35½
	Santiago	May 7, 1857	29	2	31	3	35	6	35	4	36½	3	36	2	30½	9½	39	29½
Ship	Thomas W. Sears	May 8, 1855	29	3	30½	2½	33½	1½	35	4	39	3	22	4	11	5	33½	23
	Blondel	May 8, 1857	28	2½	30	2	32	3	33	8	32	3	32	2	26	8	36	28½
Ship	Nabob	May 8, 1858	30½	2	33	3½	35½	1½	37	1½	37	3	37	9	11½	3	36	23½
	Rambler	May 9, 1848	27	2	30	3½	34	1½	35	1½	33	2½	30	4	18½	6	37	21½
Ship	Henry Turk	May 11, 1836	26	2½	29½	2	32	2½	32	3½	27½	3	28	3	19	7	36	23½
	Horsburg	May 12, 1849	29½	5	31½	4	33½	2	33	3	36	2	35½	4	27½	8	36½	28
Bark	Candace	May 12, 1854	30½	2	32	2½	33½	3½	35	2½	35	3½	34½	4	32½	10	40½	27½
Ship	Vancouver	May 13, 1850	27½	1½	28½	1½	29	2	32½	2	32	3	28	2½	24	7½	34	20
	Surprise	May 13, 1855	29	2	30½	2	33	2	33	4	34	5	34	6½	27½	8	41	29½
Ship	Bay State	May 14, 1853	29½	3½	31½	2	32½	2	32½	3	31½	3	27½	6	19	8½	34½	27½
	Orissa	May 16, 1855	30½	1½	31½	3	34½	2	35½	1½	35½	2	33	5½	23½	5½	38½	21
Ship	Nabob	May 17, 1857	30½	3	34	4½	35	2½	37	1	36	3	29	4	12	2½	31	20½
	Josiah Bradlee	May 18, 1858	30½	2	33	3½	35½	2	37½	5	36½	4	27	3½	15	6½	36½	26½
Ship	Swordfish	May 20, 1858	31½	2	35	3	35	2	37	5	35	3½	23½	2½	14½	9½	41½	27½
	Beverly	May 21, 1857	26½	2	29½	3	33	2	32½	2	32	5	24½	3	21	7	37½	24
Ship	Joshua Bates	May 22, 1855	28½	2	31	3½	33	5	35½	3	3½	4	29½	3	22½	7	36½	27½
	Houqua	May 22, 1856	26½	2½	28	1½	29	1½	30	2½	32	2½	26½	3½	13½	8	36	22
Bark	Said-bin-Sultan	May 22, 1857	28½	2	33	4	33	2	35	3	31	2	29	2	26½	10	35½	25
Ship	Judge Shaw	May 23, 1855	27½	3	29½	4	32½	3	36½	4	32½	5	27	5	16	7½	34	31½
	Panama	May 23, 1856	28	1½	30	1½	30½	1	32½	2	34½	2	35½	2½	30½	8	42	18½
Ship	Arto	May 23, 1856	26½	1	26½	1½	28½	1½	30	2	31½	3	27½	3	17	6	35½	18
	Nestorian	May 24, 1851	29½	3	32	4½	33	2½	36½	2½	37½	2½	39½	1½	38	9½	38½	26½
Ship	William Goddard	May 25, 1853	26½	3	28½	2½	29½	1½	31½	1½	31½	2½	32	6½	29½	9½	36	27½
	Augustine Heard	May 26, 1855	26	2½	28½	3½	31	4	33½	2	32	4	29	4	22½	9½	37	29½
Ship	Manjoor	May 27, 1858	27½	3½	29½	1½	29½	3½	26½	7	21½	1½	20½	2	16½	6½	36	25½
	Siam	May 29, 1849	28½	1½	31	4	32½	3	35	8	35½	2	32½	3	23½	6½	35½	28
Ship	Horatio	May 29, 1855	32½	3	34	4½	34½	1½	35½	2	36	3	30½	3	21	7½	36	24½
	Union	May 29, 1857	31	2	33	2	34	1	35	6	36	3	37	1½	32	11½	39	27½
Ship	Surprise	May 29, 1857	28	1½	32	2	34	1	34	2	34	2	30½	2	29	8	37½	18½
	Shooting Star	May 30, 1854	29	2	30½	2½	34½	3½	38	2	37½	4	28	7	11	4½	34	25½
Bark	Hollander	May 30, 1857	29	3	33	4	32½	3	34	2	33	2½	30	3½	22½	8	38	26
Thirty-six passages—averages			29	2½	31½	3	32½	2½	34	3½	33½	3	29½	4	22	7½	37	25½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

EAST OF 25 DEGREES.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Ship.....	North Bend.....	May 1, 1848	22½	2	25	2½	27	1½	28½	2	29½	2	29½	5½	23	9	34½	24½
Bark.....	Europa.....	May 2, 1851	20½	2½	24½	2	28½	2	30½	2	33½	2½	29	3	21½	7½	37½	21½
Ship.....	Sarah.....	May 3, 1846	18½	6	24	2½	26	3	27	3	27	4½	27	5½	19	9	37	33½
	Red Gauntlet.....	May 4, 1857	23	2	24	1½	27	1½	29	1½	31½	2	30	2	23½	7	41½	17½
	Monterey.....	May 6, 1857	22½	3	27½	2	30	1½	30½	4	28½	4	23½	3	15½	5	36½	29½
	Lowther Castle.....	May 7, 1815	22½	2	23½	2	26½	2½	28	2	27½	3½	22	4	12	3½	34	19½
	George and Albert....	May 9, 1816	17½	2½	20½	2½	23	1½	24½	2½	25	2½	26½	3	28½	10½	36½	25
	Medora.....	May 11, 1845	21½	3	25½	2	28½	2	30½	2	32	2	31½	3	24½	9½	34	23½
	Marq'se de Bomerulus	May 12, 1864	24	2	28	1½	30½	2½	29½	3	32	2½	29	4½	18	6½	37½	22½
	Restitution.....	May 14, 1815	22	3	25½	3	28½	2	30½	3	28	3	22½	2	18	6½	37½	22½
	Serampore.....	May 14, 1847	24	1½	27	2½	29	2½	31½	2	31½	4	29	2	26½	15	37	29½
	New Jersey.....	May 16, 1830	19½	2	21	1½	23	1½	24½	2	27	3½	26½	2½	22	5½	36½	18½
Brig.....	Argyle.....	May 16, 1835	24	2½	27½	1½	29	1½	30	1½	31	3	25	3½	14½	5½	33½	19½
	Malay.....	May 18, 1823	24½	2	26½	2	30	2	32½	2	31½	2½	31	2½	31½	13	36	26
Ship.....	Electric Flash.....	May 18, 1857	23	3½	25½	4	27	2	27	3	24½	4	23	6	11½	4	35	26½
Bark.....	Sappho.....	May 24, 1847	22½	3	29	1½	29½	2½	31	5½	28	6	22	3	16½	7	33	28½
Ship.....	Eliza Warwick.....	May 24, 1848	23½	1½	29	1½	31	2	32	3	35	2	33	3	29	8½	36	21½
	Sophia.....	May 27, 1841	18½	2	20½	2	23½	2	25½	3	26	4	23	3½	17	4½	36	20½
Eighteen passages—averages.....			21½	2½	25½	2	27½	2	29	2½	30	3½	26½	3½	20½	7½	36	23½

WEST OF 25 DEGREES.

Ship.....	Henry V are.....	June 1, 1854	28	1½	29½	2	30½	2	31½	2	33	9½	16	5½	10	5½	35½	28½
U. S. ship.....	Portsmouth.....	June 1, 1856	33	5½	33	2½	34	3	36½	4	37½	1	36½	3	38	13	40½	32
Ship.....	Joshua Bates.....	June 3, 1850	28½	2	29	3	32½	1½	32½	1½	30½	2	26	7	16½	4	37	21
	Shirley.....	June 3, 1854	31½	2	33	2½	34½	2½	35½	4½	37½	3½	36½	3½	32	8½	35	27
Bark.....	Said-bin-Sultan.....	June 4, 1850	28½	2	30½	2½	35	2	35½	4½	37	2	36	9½	27	12½	39	35
	S. H. Snow.....	June 4, 1858	31½	3½	31½	2	31½	6	31½	3½	31½	2½	31	1½	29½	9½	40½	29
Ship.....	Siam.....	June 5, 1850	28	2	27½	1½	29	1½	30½	1	29½	2½	26	4	28	6½	35	19½
	Swordfish.....	June 5, 1857	30½	1½	32½	1½	34½	2	35	4	28½	3½	30½	2	29½	8½	41	23
	Sweepstakes.....	June 5, 1857	31	3½	32	1½	34	1½	35½	1	35½	1½	34	2	29	8	35	18½
	Indian.....	June 5, 1858	27	2½	26½	1½	26½	5	28	5	29	2	30½	3	25½	10	36	29
	Surprise.....	June 5, 1858	29½	2	28½	2	27	1	26	2	22½	2	16	1	14	6	35	16
	Fortitude.....	June 6, 1835	27½	2	29½	1½	31	1½	32½	1½	33½	4	29	3½	24	7½	36½	21½
Bark.....	Godfrey.....	June 6, 1856	31½	4	33	6	35	2	35½	6	36	3	33½	4	30	11	44	36
Ship.....	Audubon.....	June 7, 1852	32	4	31½	3	33	3	35	3	35½	5½	33	6	23	8½	37	33½
Bark.....	Brothers.....	June 7, 1858	27½	1½	27½	3	30	4	30½	3½	29½	2½	31	6	23½	8½	37	28½
Ship.....	United States.....	June 11, 1857	31	2	32	2	34	2	35	4	36½	5	38	1½	37	12	36	28½
Bark.....	Texas.....	June 14, 1853	31½	3	33½	12	34½	2	36½	3	38	4½	31	3	23	6	36½	33½
Ship.....	Roman.....	June 15, 1850	29½	2	30½	1½	33½	1½	35½	1½	37	1½	35½	4	22½	8½	33	20½
	Challenge.....	June 15, 1856	31½	3	34	5	34	2	36	2	37	2	36½	3	30½	7½	43	24½
	Tonquin.....	June 16, 1848	30	3	32½	4	35	4	36	2	34	3½	30½	2½	30	8½	35½	27
	Oneida.....	June 16, 1852	29½	2½	31	2½	34½	2½	31	2	37	3	38½	5	29½	8½	36½	26½
	Ariel.....	June 16, 1854	30½	2	31½	2	33	2	35½	2	35½	2	34	5	21½	8	37½	23
Bark.....	Penguin.....	June 16, 1854	26½	2	27	2½	27½	1½	29	2	29½	3	24½	10	13½	5	34	26
Ship.....	Nightingale.....	June 17, 1854	28½	1½	29	2	31½	1½	32	1½	33	1½	33	2½	31	8½	43½	18½
Yacht.....	Halcyon.....	June 17, 1855	30½	2½	31	2½	34	2	34	1½	31	3½	31½	9	15	6	37	27
Ship.....	Union.....	June 18, 1853	26½	2	28½	1½	28½	2½	29½	3½	33	2½	29	3	22½	6½	36½	21½
	Golden Horn.....	June 18, 1857	33½	4	32	1½	34½	2	34½	2	35½	2	35½	2	31½	8	40	21½
	Borneo.....	June 18, 1857	35	7	33½	2	34½	2	34½	1	34½	2	31½	3	26½	8½	33	25½
	Unicorn.....	June 19, 1843	25½	2	27½	2	30	2	31½	3	29½	3	33½	3½	24	8½	37	24
Bark.....	Pioneer.....	June 19, 1844	28½	2	30½	1½	28½	1½	28	1½	27	1½	26½	5	26½	15	37½	28
Ship.....	Milton.....	June 19, 1850	29½	2	30½	2	32	2	33	1½	32½	1½	30½	4	27	9	36½	22
Bark.....	Candace.....	June 19, 1855	31½	3½	33	2½	34	2	35	2	36	1½	34	9½	13	5	37	26
Ship.....	Siam.....	June 21, 1848	28	1½	31	3½	34	3	32½	2	29½	2½	29	1½	29½	7½	36½	22
	Equator.....	June 21, 1851	31	2	31	3	33	5	34½	2	35	1½	33½	2½	28½	9½	34½	25½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—															Latitude of crossing meridian of Green- wich.	Total days.
Class.	Name.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.			
Ship.....	Milton	June 21, 1851	28½	2	29	2	30½	4½	30	2	31½	2½	29	4	25	9½	35	26½	
Bark	Hersilea	June 21, 1853	29½	2½	31½	4	33½	2	33½	3	35½	4½	31½	3½	23	6	37	26	
Ship.....	Endeavor	June 21, 1857	31½	3	33	2	34	2	35	2	33	1	32	2	28	6½	37	18½	
	E. Morris	June 22, 1855	31½	3½	33	3	35	1½	36½	2½	37	2	38½	2	33½	13	40	27½	
	Golden Rule.....	June 22, 1855	29½	2½	32	1½	32½	1½	33	1½	34	2	33½	14	9½	1½	32	24½	
Bark	Sarah H. Snow	June 23, 1857	31½	2½	32½	2	32½	2	34	2	33½	1½	32	2½	27	9	35½	21½	
Ship.....	Montauk	June 24, 1848	27	2	30	2½	32½	2	30½	3	29	1½	29½	1½	27½	6½	26½	19½	
	Oneida	June 24, 1849	29	2½	32	3	33½	2	34	1½	32½	1	31	2	27	8	40	20	
	Panther	June 25, 1835	26	1½	27	1½	29½	1½	30½	1½	30	2½	30½	2½	31	10½	37½	21½	
	Game Cock.....	June 25, 1857	27	1½	28	2	30	2	31	5	29	3	21½	5	4	3	33½	21½	
Bark	Grafton	June 26, 1827	27	2	28½	1½	29	1½	30½	1½	30	5½	32	2½	29	8	37	22½	
Ship.....	Sapphire	June 27, 1833	25½	2	28½	2	31½	2	33½	2	35	3	33	5	21½	7	35	23	
	Panther	June 27, 1856	29½	2	31½	2	34	2	34	2	35½	3	29½	3	24	8½	38½	22½	
	Artos	June 27, 1857	27	1½	29	1½	31	1½	31½	1	31½	1½	31½	2½	25	6½	38	16	
	Jamestown	June 27, 1857	28½	1½	31½	2	33½	1½	34½	1½	35½	2	35	2	35½	12½	41	23	
	Ganges	June 27, 1857	29½	2	32	2½	35	1½	36	1½	36	2	37	2	35	11½	40½	23	
	Arab	June 29, 1839	25½	2	26	2	29	1½	30½	1½	31	2	28	5½	20	5½	34½	20½	
Fifty-one passages—averages.....			29½	2½	30½	2½	32½	2½	33	2½	33½	2½	31½	4	27	8½	37	24½	

EAST OF 25 DEGREES.

Ship.....	Asia	June 7, 1849	22½	4	28	3	32½	3	34	3½	34½	4½	31½	6½	30	12½	35½	36½
	Torrent	June 8, 1854	25	2	27½	2	29	4	33	3	35	3	34	5	25	10½	35½	29½
	Panama	June 14, 1850	25	2½	26½	2	27½	2	28½	1½	29½	3½	26	3	22½	9	33	23½
Bark.....	Valparaiso	June 19, 1841	23½	2	26½	2	29	1½	31	2	32½	4	32½	4	20½	8	36½	23½
Ship.....	Valparaiso	June 19, 1843	21½	2	22½	2	24½	2½	26	2½	26	5	26½	2½	23	8½	37½	25
	Albion	June 19, 1839	25	2½	26	2	29	1½	30	2	31½	2½	33½	3½	29½	13	34½	27
	Samuel Russell	June 24, 1848	24½	2	27½	1½	30½	2	27	3½	23	2	25½	1½	26	6½	36½	19½
	Italy	June 27, 1856	25	6	31½	4	35	8	36	2½	36½	1½	35½	3½	34	10½	38	36
Eight passages—averages			24	2½	27	2½	29½	3	30½	2½	31	3½	30½	3½	26½	9½	36	27½

WEST OF 25 DEGREES.

Ship.....	Oneida	July 3, 1850	29½	2	30½	1½	32½	1½	34	3	33	3	30	3	27½	6½	37½	20½
	Ariel	July 3, 1850	33½	4	33½	4½	34½	2½	38	3	36½	2	33½	4	23	7½	37½	27½
	Helena	July 4, 1852	3½	3½	32½	1½	33	1	34	2½	36½	2	35	2½	31½	7½	37	20½
	Bazar	July 5, 1842	30	2	32	2	33½	2	35½	2	36	4	31½	3½	23	10	36½	25½
	Boston Light	July 5, 1856	30½	1½	33	2½	35	3	38	4	37	4	35½	1½	31	12	42½	28½
	St. Paul	July 7, 1840	25½	2	25½	2½	27½	2½	30	3	32	2	30	5½	21	8½	34	26
	John Bertram	July 8, 1854	32½	3½	33½	1½	34	1½	34	1½	34½	1½	33½	1½	31½	8½	36½	18½
	Sabine	July 10, 1857	30½	1½	32	5	33	3	35½	2	36	4	26	4	17½	6	39	25½
	Free Trade	July 11, 1855	32½	4½	33	3	34½	2	36½	2	35	2	29	2	22	6½	37½	22
	Bonita	July 11, 1855	31½	3½	34½	4	35	1	36	2	35½	2	32½	1½	28	6½	38½	20½
Bark.....	Ronaldson	July 12, 1844	27	2	29½	2	32	2½	31	2	31½	4½	31½	4	30½	10	36½	27
	Falcon	July 13, 1855	27½	3½	30	1½	30½	1½	31½	1½	30½	1½	29	3	21	5½	36½	18½
Ship.....	Nestorian	July 14, 1850	28	2	31	2½	34½	1½	36	2	35½	2½	30	4½	22	8½	38	23½
	Alipore	July 14, 1851	27½	4½	28½	1½	27½	2	30½	2	31½	3	28½	5	21½	7½	36½	25½
	Magnolia	July 14, 1855	34½	4	35½	7	35½	2	34½	2	35½	2	35½	2	32½	11½	40½	30½
	Mount Vernon	July 15, 1834	26½	2	28½	3	31½	2	33½	2½	35½	1½	34½	8½	18	5½	35	25
	Orissa	July 16, 1849	26½	1½	27	2	30	2½	35	3½	37	2	35½	3½	27½	11½	35	26½
	Horatio	July 16, 1838	28½	2	29½	1	31	2	32	1½	32½	2½	33½	3	32	9½	36½	21½
	Indiaman	July 19, 1856	32	2	35½	6½	34½	1½	36	3	39	4½	35	2	28	6½	37½	26
Bark.....	Fairy	July 19, 1856	28½	2½	33	3½	33	2½	35	1½	38	2½	38½	5	24	5½	36	22½
	Trenton	July 20, 1839	26½	2	27½	2	29½	2	31	1½	31½	2½	33½	2½	27	9½	38½	22

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Ship.....	Vancouver	July 21, 1848	27½	2	32	2	34½	2	36	1½	37	2½	34½	3½	31	9	36½	22½
	Siam	July 21, 1856	26	3	33½	7	34½	5	36	5	36	2	33½	3	24	8½	36½	33½
	Esther May	July 23, 1850	32½	2	34	4	35	2½	37½	6½	36½	2	31	1½	30	11½	39	30
	Northwester	July 23, 1855	33	2½	34	2	35	1	36	1½	37	1½	36	2	32½	8	33½	18½
	Ann Maria	July 23, 1855	28½	2½	31	2	32½	2	35½	2	36	1½	34½	2½	31½	12	35½	24½
	Sea Eagle	July 25, 1855	33	8	31	2	34	2	35	3	35½	5	30½	5	29½	8	34½	33
	Cohota	July 26, 1847	27½	½	29	1½	31½	1½	33	1½	32	1½	28	1½	25	8½	38½	16½
	Orion	July 30, 1857	30½	2½	32½	3½	34	1½	33½	5½	34½	3	38½	4	36	15½	43	35½
	Hamlet	July 31, 1855	27½	3	31	2	33½	3	34½	2½	36½	2½	34½	4½	35½	12½	39½	29½
	Escort	July 31, 1856	26½	1½	29	2	34	2½	35½	4	37	2	34½	3½	20½	8	38	23½
Thirty-one passages—averages			29½	2½	31½	2½	33	2	34	2½	35½	2½	33½	3½	27	8½	37½	24½

EAST OF 25 DEGREES.

Bark	Heber	July 2, 1844	21	1	23	2½	25	2	26½	4	23½	1½	20½	1½	17½	3½	36	16½
Ship	North Bend	July 5, 1846	23½	2	26½	2	29½	2	32½	2½	35½	2½	36	3½	32	12½	37½	26½
	Heber	July 5, 1846	24	1½	26	2	29	1½	30	2	32	2½	31½	4	27	10	36½	23½
	Omega	July 6, 1837	22½	2	25	2	26	2	30	2	31½	2½	25	6	8	3½	34	20
Bark	Candace	July 7, 1850	25	2	25½	1½	26½	2	30	4	29½	2	29½	4	18½	5½	34½	20½
Ship	Albion	July 8, 1838	23½	2½	27	2	29	1½	31	2½	32	2½	35	3	27	9	35	23
	Heber	July 9, 1845	24½	2½	26½	2	27½	1½	28	3	29½	3	30½	2½	27	11½	34½	26
Bark	Douglass	July 9, 1845	23½	2	26	2	27	1	28	2½	29	3½	30	2½	30	11½	34½	24½
	Regatta	July 9, 1850	23½	2½	25	2½	27	2	28	2½	28½	4	26	2½	6½	2½	34½	40
Ship	Panama	July 11, 1830	24	2	26½	2½	27½	2½	30½	5	31½	3½	35	3	32	13½	38	32
	Brooklyn	July 11, 1842	20½	2½	26½	2	29½	2	32	1½	34	3	31½	4½	22½	8½	36½	24
	Colota	July 11, 1848	24	1½	25½	1½	28	1½	30	1½	30½	2½	30	5	22	7½	38½	20½
	R. Pulsford	July 12, 1848	24½	2	25½	2	28	2	30	2	32½	3	30	4	24½	9	36½	24
	Probus	July 16, 1843	24	2½	26½	1½	28½	2	29	2	28½	4	20	5	15	6	32	23
Bark	Zenobia	July 17, 1823	24	1½	27	1½	29½	2	30½	2	29½	4	20½	6	14	6	31½	23
Ship	Oneida	July 17, 1853	25	2½	26½	2	28½	1½	30	2	31	2	29½	2½	24½	6½	35½	18½
	Emily Taylor	July 18, 1836	22½	1½	24½	2	26½	1½	29	1½	31	2½	29½	4	22	6½	36½	20
	Navigator	July 18, 1850	24½	3	27	2	28½	2	29½	3	32	2½	31½	8	17	6	36	26½
Bark	Esther Francis	July 19, 1853	21	2	23½	1½	25	2	26½	2	27½	2	25½	3	16½	5	34½	17½
Ship	Valparaiso	July 20, 1839	24	1½	26	1½	27	2	29½	1½	29	2	27	3½	23	5½	36	17½
	Moses Wheeler	July 20, 1857	20	2	23½	2	25½	2	26½	4	27	5	23	1½	26	6½	41½	23½
	Fisher Ames	July 23, 1817	24½	3	26	4	28	2	29	3	29½	2	29½	5	29½	15½	36½	34½
Bark	Ann Maria	July 23, 1844	24½	2	25½	2	30	2	32	1½	34	1½	33½	2½	28	9	40½	20½
Ship	Caribbean	July 23, 1855	25	2½	28½	2	31	1	32½	2	35½	1½	35½	2½	27½	9	32½	27½
	Valkyrien	July 25, 1851	22½	2	25½	1½	27½	2	29	3	28	3	19	3½	10½	2	34	17
	Sartelle	July 27, 1847	23½	3	25	2	25½	2	26½	2	28½	2	29½	2	27½	10	37½	23
	Prince de Joinville	July 27, 1848	23½	2½	24½	2	25½	2	28	2	29½	1½	26½	3	20½	7	36½	20
Twenty-seven passages—averages			23½	2	25½	2	27½	1½	29½	2½	30½	2½	28½	4½	22	7½	35½	23½

WEST OF 25 DEGR ES.

Ship	Horatio	Aug. 1, 1856	28	2	30	2	32½	2	33	4	36½	2½	33	3	23	9½	38	25
	Canvasback	Aug. 1, 1858	30½	3	32	2	34	1½	35½	2	37	1½	37½	1½	35½	10	38½	21½
	Burmah	Aug. 3, 1848	29	2	30½	2	32½	2½	33	3½	29	5	23	2	14	6½	35½	23½
	Eben Preble	Aug. 6, 1849	28	2	29½	1½	30½	1½	32	2	32	3	27½	3½	23	7	37½	20½
	Audubon	Aug. 6, 1853	30	2	30	2	34½	2	36	4	37	2	34½	2½	32	11½	40½	26
	Oneida	Aug. 7, 1817	27	2	26	1½	31	1½	32	2½	33½	1½	31	2	22	9	35	20
	Violet	Aug. 7, 1858	29	2	31½	3	34	2	36	5	32½	2	28½	6	19	5½	37	25½
	Canvasback	Aug. 9, 1857	30½	2	32	2	33	2	35	2	37½	2	39½	4½	35	11	36½	25½
Bark	Candace	Aug. 14, 1848	27½	2½	32	3½	34	3½	36½	3	37	2½	32	3	23	8	36½	26
Ship	Sweden	Aug. 14, 1855	29½	2	32	4	34½	2	35½	2	36	2	33½	2	28½	13	41½	27

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Name.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Ship	Akbar	Aug. 15, 1843	25½	1½	28	2	30½	3	33½	5½	33	2½	33	1	31	11	39	26½
	Herbert	Aug. 16, 1854	30½	2	33	5	35	2	34	1½	31½	3½	24	3	17	5	35½	22½
	Indian	Aug. 18, 1857	25½	2½	27½	2	31	1	32	3	28½	2½	26	3½	18½	4½	36	19½
	Florence Nightingale.	Aug. 19, 1857	29	2½	32	3½	35	2	34½	2	32½	3½	32	3	27½	8½	38½	25½
	New Jersey	Aug. 20, 1827	25½	2	29½	1½	32	1½	34½	1½	35½	2	32	3	24½	10	39½	22
Bark	Aura	Aug. 20, 1853	30½	4	32	1½	32½	1½	33½	2	34	2	35½	2	33	15½	37	28½
Schooner	Antelope	Aug. 21, 1855	33	1½	34	3½	35	1½	35	1½	35½	2	35	2	31½	8½	43	20½
Ship	Oscar	Aug. 22, 1841	28	2	30	3½	32½	1½	34	2	34	2	34	3	31½	5½	35½	26
	Gertrude	Aug. 22, 1854	32½	2½	33½	1½	34	2	34½	4	32	3½	29½	1½	29½	9½	49	24½
	Sarah	Aug. 26, 1847	25½	2	28	1½	30	2	32	2	30½	3½	28	4	24½	11	36½	26
	Hamilton	Aug. 30, 1840	26	2½	29½	2	32	2	34	1½	34½	2	32	3	24	8½	37	21½
	Horatio	Aug. 30, 1846	27	2½	31½	1½	32½	1½	31½	6	25	2½	24	3½	19	6	35	23½
	Azzan	Aug. 31, 1856	27	2	30½	2	33	2	35	2	38	2	38½	2	38½	12	43½	24
	Twenty-three passages—averages		28½	2½	30½	2½	32½	2	34	2½	33½	2½	31½	3	25½	9½	38	24

EAST OF 25 DEGREES, (INCLUSIVE)

Ship	Franklin	Aug. 2, 1843	24	3½	25½	2	26½	2	27	2	26	2	25	3	22	9½	39½	24
	Burmah	Aug. 2, 1847	25	2	26½	2	28½	2	30½	4	30	3½	27	3	19	7	36	23½
	George Sanders	Aug. 7, 1825	20½	2½	23	1½	24½	2	24	4	27½	2	27	2	23½	7	34½	21
	Franklin	Aug. 7, 1833	23	2½	25	1½	27½	2	30½	1½	30	2½	27½	6½	12	6	33	22½
	Patriot	Aug. 8, 1841	20	3	22	2½	25½	3½	26½	2½	26½	2½	28	5½	25	13½	38½	33
	Eben Preble	Aug. 9, 1855	25	3½	29½	2	32½	1½	31½	2	35	2	32½	1½	30	9½	36½	21½
	Roland	Aug. 9, 1839	21	2	24½	2	28	2	27½	4	27	2	23½	4½	8½	2	32	18½
	Hereclide	Aug. 17, 1833	23½	2½	26½	2	28	1½	28½	1½	27½	2	27	6½	17½	7	37	23
	Restitution	Aug. 18, 1821	20½	3	23½	2	26½	2	28	2	30	3	27½	3	19½	9	38½	24
Bark	Frederick Warren	Aug. 18, 1837	23½	2	25½	1½	29	2½	31	3	31½	1½	29	3½	20	8	37½	22
Ship	Miltiades	Aug. 18, 1852	21	3	25	1½	28	1½	30	2½	32	3	28½	4	17	6	39	22
	Isabella	Aug. 19, 1849	24	2½	27½	2	30	2	33	2	36	2½	37½	3	30	9½	35½	23½
	Rome	Aug. 20, 1844	11	3	14	3	17½	3	19½	2	21	4	18½	7	12	5½	35	27½
	Panther	Aug. 23, 1854	22½	1½	25	1½	27½	1½	29	3	27	8	12½	2½	10½	3½	33½	22
	Oneda	Aug. 26, 1848	17	2½	21½	2	24½	2	27½	2	29½	2	30	2	27	8½	37½	21
Bark	Borneo	Aug. 26, 1850	19	3	23½	2	26½	3	29½	2	30½	2½	27	2½	21	7½	35	22½
Ship	Endeavor	Aug. 29, 1832	22½	3	24	2	25	2	28	2	29½	2	29	3	24½	9½	38½	23½
Bark	Lenox	Aug. 29, 1846	19½	2½	23	2	27	1½	28½	2	26½	7½	16	4½	12½	4	36½	23½
Ship	Vernon	Aug. 29, 1847	24	2½	25½	1½	27	2	28½	2½	30½	2	30	4½	24½	12	36½	27
Bark	Falcon	Aug. 29, 1856	22½	2	23½	2	25½	2	26	2	28	4	30	5	28	11	35	28
Ship	Tarolinta	Aug. 30, 1855	24½	2½	27½	2	29½	1½	29	4½	31	2½	27½	5½	20	7½	33½	26½
Twenty-one passages—averages			21½	2½	24½	2	26½	2	28½	2½	29½	3	26½	4	20½	7½	36½	23½

WEST OF 25 DEGREES.

Ship	Tartar	Sept. 2, 1846	27	2½	30	2	32½	2	35	2½	36½	2	33	2½	24½	8	37	21
Bark	Siri	Sept. 3, 1855	31	1½	32½	1½	33½	2	35	3	36	3½	29½	2½	28	9½	39½	23½
	Adjuster	Sept. 3, 1857	33	2	34	2	33½	2	33½	1	34½	2	33½	1	33½	10½	44	20½
Ship	Gertrude	Sept. 4, 1852	31½	2	32	1½	33½	1½	34	2	31½	5½	30½	4½	28	10½	36	27½
	Tri Mountain	Sept. 5, 1856	28½	4	32½	5	35	2	35½	2	34	2	31½	5	25½	8	36½	28
	Derby	Sept. 5, 1857	29	2	31½	1½	33	2½	33½	2	30½	2	27	2	20	6	34½	18
	N. B. Palmer	Sept. 8, 1856	33	4½	33½	2	34½	1½	35	1½	33	2½	28½	3	21½	5½	37	20½
	George	Sept. 10, 1828	27½	3	32½	5	33	1	32½	2½	29	3½	21½	3	18	6½	36	24½
	Rapid	Sept. 10, 1855	30	3½	33	2	35½	2	37	2	34½	3	26½	3	14½	3½	36	19
	Eureka	Sept. 15, 1857	31	3	34	2	34½	2	34½	1½	33	1½	33½	1	31½	9½	35	20½
	Joshua Bates	Sept. 17, 1856	27	3½	32	2½	33½	1½	34½	2	33½	2	31½	4	24	9½	42½	25
Bark	Auckland	Sept. 18, 1853	30½	2½	32½	2½	32	6	30½	3	33	1½	34	1½	33½	15½	53	32½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—															Latitude of crossing meridian of Green- wich.	Total days.
Class.	N. mcs.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.			
Ship.....	Hindo.....	Sept. 18, 1856	25½	3	29½	2	31	2	31½	2	32	6	28½	4	24	11½	39	30½	
	Argo.....	Sept. 19, 1850	26½	2	30½	2	31½	2	32	2	32	5	31	4	28½	12	36½	29	
	Monterey.....	Sept. 19, 1855	25½	2	28½	2	30	1	30	3	26½	6½	23½	2	20	8	36½	24½	
	Tsar.....	Sept. 20, 1854	28½	1½	29	2½	29½	1½	29½	2	28½	2	26½	2½	26½	10½	37	23	
	Josiah Bradlee.....	Sept. 21, 1854	28	2½	30	1½	30½	1½	31½	2	31½	1½	30½	2½	27½	10	36	22	
Bark.....	Grafton.....	Sept. 22, 1848	28½	2	30½	3	34	6	25½	2	25	2	23½	2½	21	6	37	23½	
Ship.....	Channing.....	Sept. 22, 1850	30	1½	32	1½	33	1½	34½	2	34½	5	30½	2½	30	15½	35½	29½	
	Elizabeth...	Sept. 22, 1857	29	2½	30	2	31	3	32	2	33	3	33	5	32	12	32½	29½	
	Vision.....	Sept. 27, 1855	26½	2	29	2	32	2	34	2	33	3	29	4	29	13	34½	28	
	N. B Palmer.....	Sept. 28, 1855	32	1½	33	1½	34½	2	34	2	30½	3	23½	2½	22½	6½	37	19½	
	Cervantes.....	Sept. 28, 1857	26½	2	29½	1	30½	2	34½	2	34	2½	34	3½	29½	8½	37½	21½	
	Beverly.....	Sept. 29, 1857	33	1½	34	1½	35	1½	36½	1½	37	2½	36½	4½	30½	7½	42	20½	
	Twenty-four passages—averages.....		29½	2½	31½	2½	32½	2½	33½	2	32½	3	29½	3	26	9½	38	24½	

EAST OF 25 DEGREES.

Ship.....	Restitution.....	Sept. 3, 1824	22½	2½	26½	2	28	1	29½	8	29½	4	26½	1½	23	7½	37	26½
Bark.....	Grafton.....	Sept. 3, 1846	25	2	27½	1½	29½	2½	34½	2½	36	1½	34	4	26½	11	39	25
Ship.....	Monarch of the Sea..	Sept. 3, 1857	24	2	26½	1½	30	1½	31½	2½	31	2	29	2	26	9½	35½	21½
	Hurricane.....	Sept. 4, 1855	18½	1½	21	1½	24	1½	26	1½	28½	1	27	4	14½	5½	31½	17½
Bark.....	Valparaiso.....	Sept. 5, 1838	12½	2½	14½	1½	16½	1½	17½	3	17½	2	18½	1½	19½	8½	36½	20½
Ship.....	Arabella.....	Sept. 7, 1853	22½	2½	25½	2	27	2	29½	2	29	3	23½	3	17½	10	38	24½
Bark.....	Kensington.....	Sept. 13, 1848	20½	3	25½	2	27½	1½	29	2½	29½	3	29½	2	25	9	37½	23
Ship.....	Eben Preble.....	Sept. 14, 1838	24	2	28	2	29½	1½	30½	1½	31½	1½	31	3½	29	8½	38	20½
	Highlander.....	Sept. 15, 1858	20	3	24	1½	26½	2	29	2	30	3½	30½	1½	31½	15½	40½	29
	Loo Choo.....	Sept. 16, 1844	23½	2	26½	2	28	1½	28½	2½	25½	2½	19	2½	11½	3½	35½	16
Bark.....	Oak.....	Sept. 16, 1859	25	2½	29½	1½	32	2	34½	1½	34½	1½	34	8	11½	9½	38	26½
Ship.....	Helena.....	Sept. 18, 1853	24	1½	24	2	24	4½	26	4½	28	1½	30½	1½	34	10	40	25½
	Restitution.....	Sept. 20, 1816	22	3	26	2	31	2	31	2	31½	6	26½	4	22	8	36½	27
	Caroline Augusta.....	Sept. 20, 1846	22	3	26½	1½	27	2	28	2½	28½	3	23	2½	18	6½	37	21
	Goodwin.....	Sept. 20, 1847	19	7½	28	1½	29	4	31	4	29½	3	24	3	20	11	38½	34
	Rolla.....	Sept. 22, 1817	24	3	28	2	29½	2	32	2½	29	5	33½	4	33½	17	36	35½
Bark.....	Loo Choo.....	Sept. 26, 1845	23½	2½	26	1½	28½	2½	27½	1½	27½	5½	20	2	15½	5	35½	20½
Ship.....	Hanover.....	Sept. 30, 1836	24½	3	30½	2	31½	2	33	1½	30½	1½	30	2½	26	9½	37½	22½
Eighteen passages—averages.....			22	2½	25½	1½	27½	2	29½	2½	29½	2½	27½	3	22½	9	37½	24½

WEST OF 25 DEGREES.

Ship.....	Argonaut.....	Oct. 6, 1855	31½	2½	33½	1½	33	1½	33½	3	28	2½	25	3	25½	12	37½	26
	J. Montgomery.....	Oct. 7, 1856	30½	3½	32½	1½	32½	3	33	2	29½	4	25	4	18½	16	37	34
	Sea Eagle.....	Oct. 9, 1856	28½	2	30½	1½	28	2½	25½	2	23	2	21½	3½	21½	9½	41	23
	Magnolia.....	Oct. 12, 1856	29½	2	31	1	32	3	32	4	32½	2	33½	1	33	10½	44½	23½
	India.....	Oct. 14, 1843	26½	1½	27½	2	30½	1½	30½	2	32	1½	32½	1½	31	9½	38½	19½
	Argonaut.....	Oct. 14, 1856	30	2	31	2	29½	2	28	2	25½	2	24½	3½	23½	10½	39	24
	Nabob.....	Oct. 15, 1854	32½	2½	33½	3½	33½	1½	32½	2	29½	3	26½	1½	24½	5½	39½	19
Bark.....	Parodi.....	Oct. 16, 1854	30½	2	33	2½	33½	1½	33	2	30½	3	27½	2½	23½	8½	39½	22
Ship.....	M. Howes.....	Oct. 17, 1855	28½	3	31½	2	33½	2½	32½	1½	32½	4	31½	2	26½	11	39½	26
Bark.....	Three Brothers.....	Oct. 19, 1853	26½	2	28	2	30	2	30½	3½	30	3½	33	3	30½	14	44	30
Ship.....	Cohota.....	Oct. 21, 1853	27	1½	29	2	31½	2	31½	3½	31	2	31½	2	30	10	43½	23
Bark.....	Peacock.....	Oct. 21, 1854	28½	1½	30½	2	32½	1½	33	2	31	1½	29	2	23½	6½	38	17½
Ship.....	S. H. Talbot.....	Oct. 21, 1856	33½	3	34	3	32½	1	32	2	32	2	31	1½	28	8½	41½	21
	Granada.....	Oct. 24, 1854	32	2½	33½	2	34	1½	33	2	31	2	27½	3	24	7½	39½	20½
	Lowell.....	Oct. 24, 1854	29	2½	32	2	33	2	32½	2	31½	2	28½	3½	25	10	43½	24
	Geo. Lee.....	Oct. 25, 1855	30	2½	31½	2½	33½	1½	33	1½	32	2½	31	6	24	10	38	25½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—												Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.
Ship.....	Flying Dutchman....	Oct. 26, 1854	31	1½	32½	1	33½	1	33½	1½	33	1½	32	2	28	6½
Bark.....	Wm. A. Banks.....	Oct. 26, 1856	34	3	35	4	33½	2	33½	2	33	3	33	1½	33	11½
	Havana.....	Oct. 27, 1855	31	8	34	2	34½	3	36	3	35	3½	31	2½	33	14
Ship.....	Black Sea.....	Oct. 28, 1855	30½	3	34	5	34	3	35½	2	35½	2	32½	5	25½	15
Bark.....	Annie Buckman.....	Oct. 31, 1852	32	2	31½	1½	31½	1½	31	2	30	2	26	3½	20	7½
	Siri.....	Oct. 31, 1853	28	2½	31½	4½	34½	2	35½	1½	35½	1½	35	3	33½	15½
	Escort.....	Oct. 31, 1855	31½	4	3½	1½	33	1½	33½	1½	34	2½	32	3	22½	12
Twenty-three passages—averages.....			30	2½	32	2½	32½	2	32½	2½	31½	2½	29½	2½	26½	10½

EAST OF 25 DEGREES.

Ship.....	Arno.....	Oct. 4, 1848	25	2½	30	3	33	2	34	1½	35½	2	33	2	30½	10½
	Panther.....	Oct. 6, 1833	22	2½	26	1½	28½	2	29	1½	28	2½	25	4½	20	9
	Windward.....	Oct. 6, 1859	25	2	29	1½	32	1½	31½	2½	29½	1	27½	2½	21	10
	Gauntlet.....	Oct. 7, 1853	23	2	27½	1½	29	1	29½	3½	31½	2½	34	1½	30	9
Bark.....	Oriental.....	Oct. 7, 1853	20	4	24½	2½	26½	2½	29½	3½	28½	2	28	3	27	12
Ship.....	Margaret.....	Oct. 11, 1815	19	3	22½	2	25½	3	25½	2	25½	2	24	2	19½	9½
Bark.....	Lady Franklin.....	Oct. 15, 1853	24½	3	27	1½	26½	2	25	2½	24	3	19	5	7½	2½
Ship.....	Washington.....	Oct. 18, 1833	21½	3½	26	2	28½	2	30	2½	30	2	27½	4	19½	7
Bark.....	Caroline Read.....	Oct. 19, 1853	24½	1½	25½	1½	26½	2	27½	3	22½	3	21	6½	9	4½
Brig.....	Robertina.....	Oct. 28, 1853	29½	4	25½	2	27½	3	30½	3	32½	3½	31	5½	27	13½
Ship.....	Eliza.....	Oct. 30, 1824	22	2½	24½	2	25	1½	25½	1½	25½	2½	28	2½	23	8½
Eleven passages—averages.....			22½	2½	26½	2	28	2	29½	2½	29½	2½	27½	3½	21½	8½

WEST OF 25 DEGREES.

Ship.....	Magnolia.....	Nov. 2, 1853	29½	2½	31½	2½	32½	2	32½	2	32	2	30½	4	27½	11½
	Medford.....	Nov. 3, 1852	26	1½	27	2½	28	1	28½	2½	27½	2½	23½	3½	16½	10½
	Sabine.....	Nov. 3, 1855	34½	7½	34½	3	32½	2	31	2	29	2	25	2	21½	9
	Cormando.....	Nov. 4, 1842	26½	2	27½	2	28½	1½	28½	1½	28½	3	23	4	14	7
	Raven.....	Nov. 4, 1855	32½	2½	35	2	34½	1½	33	1½	31½	1½	26	4	25½	11
	Dutchess.....	Nov. 5, 1853	31½	2½	32½	2	33½	2½	33	2	32½	2½	31½	2½	29½	13
	Cyclone.....	Nov. 7, 1855	30½	2½	34	2½	34	2	30	2	27½	3	25	1½	24½	7½
	Colorado.....	Nov. 7, 1855	26	2	31½	1½	33½	1½	32½	3½	19½	3½	15½	3½	15	5½
Bark.....	Douglass.....	Nov. 9, 1846	28½	2	30½	2	30	2	28	2	24½	2	20½	3	15½	9
Ship.....	Horatio.....	Nov. 10, 1834	29	1½	31	1½	32½	1½	33	1½	32	2½	29	5½	21	6½
	Sheffield.....	Nov. 10, 1847	27½	2	28½	2	29½	2½	28½	3½	26	5½	21	4½	14½	6
	Channing.....	Nov. 10, 1849	32½	2	32	1½	32½	1½	32½	2½	31½	1½	31½	2½	29½	8
	Robert Patten.....	Nov. 10, 1856	33½	4	35	5	33½	2	33	3	33	3	31½	4½	27	10½
	India.....	Nov. 11, 1842	28½	2½	32	1½	33	2	33	2½	30½	1½	30	2	28	8½
	Duxbury.....	Nov. 11, 1844	28½	2½	30½	2½	30½	2	28½	2½	24½	2½	22½	5	16½	7½
	Hound.....	Nov. 11, 1855	31½	1½	33	1½	33½	2½	28½	2½	24½	3½	23½	1	23	5½
	Ianthe.....	Nov. 12, 1845	31½	2½	32	1½	32½	2	33½	2	34½	2	31	2½	27	10½
	Lady Arabella.....	Nov. 12, 1852	28	3	30½	2	31	2	30½	1½	29½	2½	28	5	26	11½
	N. B. Palmer.....	Nov. 12, 1854	38½	5	35	2	34	1½	31	1	28½	1	27½	1½	25	6
Bark.....	S. H. Waterman.....	Nov. 13, 1855	32	2½	32	2	31½	2	29	2	26	2½	23½	2	20	6½
Ship.....	Huntress.....	Nov. 14, 1849	27½	2½	29½	1½	30	1½	30	1½	29	3½	29	4	28½	12
	Hound.....	Nov. 14, 1854	30	1½	32	2	31	2	27½	1	26	1½	23½	3½	17½	6
	Celestial.....	Nov. 14, 1855	30½	1½	30	1½	30	1½	29	1½	26½	1½	24	1½	20	4½
	Ringlender.....	Nov. 14, 1856	36	3½	34½	2	32½	1	31½	2	29½	1	28	2	23½	9½
	Arno.....	Nov. 15, 1847	29½	2	31	2	32½	1½	33	2½	34	5	28½	2½	25	7
Bark.....	Douglass.....	Nov. 15, 1848	28	2½	31	1½	31½	1½	30	2½	27	2	24	5	15	5½
Ship.....	Manito.....	Nov. 17, 1855	29	2	32	1½	30½	1½	29	2½	24½	5	15	1½	9½	3
	Reindeer.....	Nov. 17, 1856	32½	3	32½	3	34	2	34	2	33½	3	30½	4	22½	8½
	Restitution.....	Nov. 18, 1818	25½	3	29½	2	31½	2	29½	3	26	3	24½	3	23½	9½

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Ship	Blandina Dudley.....	Nov. 18, 1856	32	1½	33½	2½	34½	2½	34	1	34½	3½	28	2	20½	6½	37½	20
	Mal'y.....	Nov. 19, 1853	31½	2½	32½	2	33	1½	33½	2	33	2½	32½	1½	32½	12	45½	24
	Mary Ross.....	Nov. 19, 1855	25	2	28	1½	29	1½	29	2	28½	3	29	4	23½	10	37½	24
	Neptune.....	Nov. 19, 1857	28	3	32	2	33	2	33	3	34½	4	27½	4	22½	13	38	31
	Queen of the East.....	Nov. 21, 1853	25½	2	28½	2	30	1½	30½	1½	29½	3	26	5	21	5½	36	20½
	Nestorian.....	Nov. 21, 1854	28½	2	30½	1½	32½	3	32	3½	27	1½	24	2½	16½	6	34½	20
	Gertrude.....	Nov. 21, 1855	38	10	35½	2	34	2	33	2	33	2	34	2	32½	9½	44	29½
Bark	Fire Fly.....	Nov. 21, 1855	29½	1½	30½	2	31	2	31	4	27½	3	25½	1½	23	11	41½	25½
	Wild Gazelle.....	Nov. 21, 1858	37½	7½	34½	3½	34½	2	34	2	33	2½	28½	3½	21	5½	35½	26½
Ship	Panama.....	Nov. 22, 1844	25½	1½	27	2	28	1½	29	2	25½	1½	22	3	18	6	37	17½
	Lebanon.....	Nov. 22, 1847	28	3½	32	1½	30½	1½	29½	1½	29	2	24½	4	10	5	35	19
	Talbot.....	Nov. 23, 1838	29½	2	31	1½	31½	1½	31½	1½	29	2	27	2½	22	8½	35	19½
	Malay.....	Nov. 23, 1856	32½	2½	34½	2½	34	1½	33	2	30½	1½	29	1½	27	10½	48	22
Bark	Chilo.....	Nov. 24, 1844	29	2	30½	2	31½	1½	29	2	28	2	26½	2½	22½	6½	37½	18½
	Dragon.....	Nov. 25, 1851	30½	2½	31½	1½	31	2	29½	3	24½	4	22½	2½	19	9½	36	24½
Ship	Frigate Bird.....	Nov. 25, 1854	30½	3	32	2	31½	1	31½	2	26½	2	21	2	16	7½	34½	19½
Brig.....	Mars.....	Nov. 26, 1797	27	4	32	3	30½	3	29	2	27½	2	24½	3	20½	9	36	26
Ship	Alexander.....	Nov. 26, 1834	26	3	27½	2	27½	2	27	2	26½	3	24	3	21	9	37½	24
	Franklin.....	Nov. 26, 1834	26½	2½	29	2	28	1½	28	2½	27½	3	25	3	21	10½	36½	25
	Cato.....	Nov. 26, 1848	30	2	31	2½	31	2½	28½	2	27½	2½	33½	7	14	6½	35½	25
	Pontiac.....	Nov. 27, 1850	33½	2½	33	2½	33½	2	33½	4	30	4	23½	3	15½	10½	33	28½
	Flying Dragon.....	Nov. 27, 1854	36	3	35	1½	32	1½	28½	2	23½	2½	18½	2½	15½	5½	37½	18½
	Northern Light.....	Nov. 27, 1857	27½	2	29½	1½	30½	1½	31	1½	31	3	29½	1	28½	12	42½	22½
	Julie.....	Nov. 27, 1857	32½	2	34½	5	34	2	32	3	30½	4	29½	1½	29	11½	37	29
	Huntress.....	Nov. 28, 1844	27½	2	30	2	31	1½	31	2	30	2½	26½	3½	27	11	37	25
	Fleetwood.....	Nov. 28, 1854	31½	2	32	2	31½	1	29½	2	27	2½	23	1½	21½	7	37½	18
	Navigator.....	Nov. 29, 1842	26	2	28	1½	28	1½	28½	1½	27½	2½	24½	3½	23	5½	37½	18½
Ship	Lotus.....	Nov. 30, 1833	31½	3½	30½	1½	31½	1½	31½	2	32	2	26	2½	21	10½	39½	23½
	La Rochelle.....	Nov. 30, 1856	27	1½	29	1½	31	2	31	3	31	2	31	3	27	11½	46	24½
Fifty-eight passages—averages.....			30	2½	29½	2	31½	1½	29	2½	28½	2½	24½	3	22	8½	38	22½

EAST OF 25 DEGREES.

Ship	Narraganset.....	Nov. 14, 1840	25	2	28½	2	30½	1½	30½	1½	30½	1½	28½	2½	28	10½	37	21½
Bark	Lucy Elizabeth.....	Nov. 18, 1853	25	2	28	2	29	2	29½	2½	29½	4½	28	5	22½	10	35½	28
Ship	Mary Ross.....	Nov. 19, 1859	25	2	28	1½	29	1½	29	2	28½	3	29	4	23½	10	37½	24
	Restitution.....	Nov. 21, 1817	24½	2	26½	2	27½	1½	25	2	23½	2	22	3	19	7	39½	19½
	Great Britain.....	Nov. 24, 1845	24½	2½	27½	1½	29½	1	30	1½	27½	1½	25½	2½	20	7	38½	17½
Five passages—averages.....			24½	2	27½	1½	29	1½	28½	2	28	2½	26½	3½	24½	9	37½	22½

WEST OF 25 DEGREES.

Ship	Charlotte.....	Dec. 2, 1841	26	1½	29½	1½	31½	1½	31½	1½	30½	1½	29½	2	26	10	40	20½
	Vancouver.....	Dec. 2, 1845	31	3	32½	1½	33½	1½	34½	2	30½	3	23	4	19	6	37½	21
	Hygeia.....	Dec. 3, 1856	26½	3	28½	2	29½	2	30½	2	30½	2½	28	2½	24½	10	36½	24
	Thomas W. Sears.....	Dec. 6, 1853	36	6	35	3	33½	3	31½	3	30½	4	27	2	24½	13	38½	34
	Pleiades.....	Dec. 6, 1856	30½	2½	32	2½	34½	2	34	2	31½	2	29	2	25½	8	40½	21½
	Parana.....	Dec. 7, 1853	32	2	33	2	33½	2	31½	2	28½	4	22½	4½	15½	5½	40	22½
	Chilo.....	Dec. 9, 1845	30½	2	31½	1½	30½	1½	30	1½	29½	1½	27½	2½	26½	9	39½	20
	Emily Farnum.....	Dec. 9, 1857	32½	3	34½	3½	34	2	33	1½	32	2	30½	2½	26½	10	45	24½
	Union.....	Dec. 10, 1850	28	2½	30½	1½	32	1½	31	1	29	1½	29½	2½	27	7½	39	18
	Benjapore.....	Dec. 10, 1855	28½	2	29½	1	29	1½	29½	1½	29	2	25	3	22½	6½	40½	17½
	Horatio.....	Dec. 11, 1843	29½	1½	30	1	30½	1½	31	1½	30	3½	26½	2	23½	9	40½	20
	Horatio.....	Dec. 11, 1850	29½	3	32	2	34	1½	34½	1½	34½	2	32½	2	28	9	37½	21

Crossings in the South Atlantic from the Line to the Prime Meridian—Continued.

WEST OF 25 DEGREES—Continued.

VESSELS.		Date of crossing equator.	LONGITUDE OF CROSSING THE PARALLELS OF—														Latitude of crossing meridian of Greenwich.	Total days.
Class.	Names.		Equator.	Days.	5° S.	Days.	10° S.	Days.	15° S.	Days.	20° S.	Days.	25° S.	Days.	30° S.	Days.		
Ship	Piscataqua	Dec. 11, 1853	31½	2½	32	2½	31	3	29	4	26	4	22½	3	16½	11	36	
	Dolphin	Dec. 12, 1846	29	1½	32	2	32	1½	32	1½	30½	1½	29	3½	23½	8	37½	19½
	Washington	Dec. 12, 1857	27½	2	30	1½	31	1½	31	2	29½	3	26	6	21	11½	36½	27½
	Benobia	Dec. 13, 1845	30½	1½	31½	1½	32	2	32½	2	32½	1½	29½	2½	24	9	37½	20
	Horatio	Dec. 13, 1851	30½	1½	31½	1½	32	1½	31½	½	29½	1½	27½	2	22½	7½	37½	16
	Granite State	Dec. 13, 1855	26	2	27	1½	30	2	28½	2	29½	1½	29	1½	27	11½	47	22½
	Golden Era	Dec. 14, 1855	29½	3	31½	2	32	2	31	3	27	2	23½	5	20	8½	39	25½
	Minnehaha	Dec. 20, 1856	27	2	29½	2	32	1	33	2	33	3	30	3	22½	8	40	21
	Lewell	Dec. 21, 1856	29½	3	32½	2	34	2	34	3	31½	2	29	2½	24	12	45	26½
	Judge Shaw	Dec. 23, 1857	32	2½	33½	3½	34	1½	32	2½	31½	2	30	3	24½	11½	39	26½
Bark	Hazard	Dec. 24, 1849	31½	1½	32½	2	34½	2	33½	2	31	2	29	2½	24½	9½	37	21½
Ship	Gravina	Dec. 24, 1853	28	2	31	1½	33	2	32	2	30	2	28½	3½	20½	9	37	22
Bark	Dragon	Dec. 24, 1856	22	2½	33½	2	32½	1	32	2	29½	2	26½	2	23	8½	42	20
Ship	White Swallow	Dec. 25, 1854	32½	1½	33½	1½	35½	2	33½	1½	32	1½	30½	2½	28	13½	44	23½
	Isaiah Crowell	Dec. 25, 1854	30½	3	31	2	32½	2	32½	3	29½	3	25½	16	10½	7	34½	36
	Raven	Dec. 25, 1858	31½	2	33½	2	34	2	33½	1½	32½	1	32	2	27½	10	42	20½
	Weymouth	Dec. 26, 1856	30½	2	32½	1½	32½	1½	31	2	28	1½	24	2½	20	7½	33½	18½
	Wm. Chamberlain	Dec. 28, 1854	34½	2	35½	2½	33½	2½	31	1½	29½	1½	27½	2½	23	6½	37	19
	Albany	Dec. 30, 1853	26½	2½	29	2	29½	2	29½	2	28	3	23	2	18½	13½	38	27
	Navigator	Dec. 31, 1843	27	2	29	2	30	1	30½	2	30½	4	29½	4	22½	9½	37	24½
	Horatio	Dec. 31, 1853	30	2	32½	2	34½	2	34	3	34	3	33½	4	21½	11	41	27
	Boston	Dec. 31, 1854	34½	5	34	1	35	2	31	1½	28½	2	25	3	19	6	36½	20½
Thirty-four passages—averages			30	2½	32	2	32½	1½	31½	2	30	2½	28	3½	22½	9½	39½	23½

EAST OF 25 DEGREES.

Ship	Albion	Dec. 3, 1833	21	2	24½	2	28	1½	29½	1½	28½	2½	26	3½	21	9½	38	23
	Alexander	Dec. 3, 1833	24	2½	25	2	26½	2	26½	1½	25½	2½	24½	3	21½	8	39½	21½
	Warsaw	Dec. 7, 1841	23½	2½	27½	1½	26	2½	31½	2½	30½	2	28½	2	24	9	35½	22
	Benj. Howard	Dec. 10, 1856	25	2	29½	1½	31½	1½	31	1½	31½	1	30½	2	26	7	37½	16½
	Valparaiso	Dec. 15, 1847	25	1½	27	1½	29½	1½	29	1½	28	1½	25	2	23	9	37½	19
	Brooklyn	Dec. 15, 1847	23½	2½	25½	2	27	2	28	2	27		26	5	23½	9	37½	24½
	Capitol	Dec. 16, 1847	24½	1½	26	1½	29	1½	29	1½	27	1½	24½	2	23	8½	38	18½
	Brooklyn	Dec. 17, 1840	24½	2½	27½	2	29	2½	29½	1½	30	2	29½	4½	25	10	36½	25½
	Warsaw	Dec. 17, 1841	23½	2½	27½	1½	26	2½	31½	2½	30½	2	28½	2	24	9	35½	22
	Arcole	Dec. 21, 1849	23½	2	26½	2	29	1	30	1½	28½	2½	25½	9	10½	6	34	24
Ten passages—averages			23½	2	26½	1½	28½	2	29½	1½	28½	2	26½	3½	22	8½	37	21½

